# Ennerdale Vegetation Monitoring Report 2013

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24 August 2013

wild water forest mountains ennerdale

National Trust United Utilities Forestry Commission England NATURAL ENGLAND

## Contents

## 1. Introduction

The purpose of this work was to re-survey the vegetation in a series of quadrats established in Ennerdale in 2006 (Miller 2006), and to compare current species and vegetation structure against the 2006 baseline in an attempt to measure ecological change in the valley. In total, ten 5m x 5m quadrats and sixteen 1m x 1m quadrats were surveyed between June and August 2013.

| Site Reference | Site Name | Quadrats | Grid Reference | Date surveyed |
|---|---|---|---|---|
| 01 | Iron Crag | 1m x 1m<br>2 Quadrats | NY 12182 12191 | 17/07/2013 |
| 02 | Side Wood | 5m x 5m<br>2 Quadrats | NY 11965 13912 | 24/06/2013 |
| 03 | Silver Cove. (Cattle grazing site-open) | 1m x 1m<br>2 Quadrats | NY 13030 13527 | 07/08/2013 |
| 04 | Silver Cove. (Cattle grazing site wooded) | 5m x 5m<br>2 Quadrats | NY 13249 13304 | 07/08/2013 |
| 05A | Silver Cove | 1m x 1m<br>2 Quadrats | NY 13225 11232 | 15/07/2013 |
| 05B | Little Gowder Crag | 1m x 1m<br>2 Quadrats | NY 14269 10888 | 15/07/2013 |
| 06 | Dubs Quarry | 1m x 1m<br>2 Quadrats<br>5m x 5m<br>2 Quadrats | NY 18479 12781 | 07/08/2013 |
| 07 | Upper Valley South Side | 1m x 1m<br>5m x 5m | NY 18247 12635 | 13/08/2013 |
| 08 | River Liza Upper Bend | 1m x 1m<br>2 Quadrats<br>5m x 5m<br>2 Quadrats | NY 18900 12371 | 13/08/2013 |
| 09 | Northern Fell fence | 1m x 1m<br>5m x 5m | NY 16951 13854 | 13/08/2013 |
| 10A | Ennerdale Water Shoreline (Cattle) | 1m x 1m<br>2 Quadrats | NY 12388 13863 | 24/06/2013 |
| 10B | Ennerdale Water Shoreline( No Cattle) | 1m x 1m<br>2 Quadrats | NY 12436 13870 | 24/06/2013 |

## 2. Methodology

Survey work was carried out over four days (24 June, 15 July, 7 Aug and 13 Aug). Quadrats were relocated using a hand held GPS (Garmin eTrex Venture HC) and with reference to the sketch maps in the 2006 report. In all cases the exact location of the quadrat was re-found thanks to wooden pegs/metal markers installed in 2006. Wooden pegs, stobs and fence posts were re-marked using orange marker paint, and replaced where necessary. A 30m tape measure and/or string was used in conjunction with four corner posts to mark the 5m x 5m quadrats, and a 1m x 1m rigid quadrat frame or string to mark the 1m x 1m quadrats.

All vascular plants and bryophytes in the quadrats were recorded together with bare ground, rock and tree stumps/brash. Where necessary, small bryophyte samples were collected for later identification. In total of 60 species of vascular plants and 38 species of bryophytes were recorded from the quadrats. As in 2006, time was not spent separating *Festuca rubra/F. ovina*, *or Polytrichum commune/ Polytrichastrum formosum*, or *Sphagnum palustre/papillosum*.

Cover of each species plus bare ground/rock/wood was estimated and assigned a DOMIN score. Height measurements were made for significant species (species with high cover, indicators such as heather/bilberry, and those recorded in 2006) by taking up to 10 measurements for each species to produce an average. For grasses and sedges, two measurements were taken; one of the inflorescence and one of the leaf.

Photographs were taken of each quadrat from approximately the same locations as in 2006. A paper copy of the 2006 report photographs was used on site to try to replicate each frame as closely as possible. Photograph numbers were recorded on the field recording form, then later re-numbered using the quadrat number and size

The exact position of the quadrat was noted using the GPS, and checked against the grid reference recorded in 2006. In all cases the 2006 grid reference proved fairly accurate, but a new reading was recorded and used on the recording sheets. Altitude was checked on Memory Map (as the GPS did not prove reliable) and minor changes were made where required.

The 2006 sketch maps proved sufficient to easily re-locate the quadrats in most cases, but where necessary, the maps have been annotated (in red) with additional information to clarify.

Botanical nomenclature follows Stace (1997) for vascular plants. For bryophytes, the relatively recent British Bryological Society field guide (Atherton, Bosanquet and Lawley Eds 2010) was used rather than Smith (2004) and Paton (1999)

## 3. Comparison with 2006 Survey

The full data is presented in Section 6 as a series of quadrat recording sheets

01 IN 1 x 1m Iron Crag
**Vascular plants**- There was little change from 2006 with no additional species. *Agrostis capillaris* was not re-found. Cover of *Agrostis canina* had reduced from 6 to 4 whilst cover of *Carex pilulifera* increased from 5 to 7. The main change was in vegetation height. The average height of *Calluna vulgaris* was reduced from 20cm in 2006 to 11.5cm in 2013 whilst *Vaccinium vitis-idaea* was reduced from 15cm to 4cm.
**Bryophytes**-*Dicranum scoparium* was not re-found, however *Polytrichum commune* was a new record. Cover of *Hypnum jutlandicum* was reduced from 7 to 4.
**Lichens**- Cover of *Cladonia* was reduced from 3 to 1

Reasons for change
The reduced height of ericoids and reduction in cover of *Hypnum jutlandicum* are likely to be due to sheep grazing as the exclosure in which the quadrat is located is no longer stockproof. There is now little difference between the vegetation inside and outside the enclosure.

01 OUT 1 x 1m Iron Crag
**Vascular plants**-All of the species recorded in 2006 were re-found and there were no additional species, however there were some changes in cover; *Empetrum nigrum* reduced from 3 in 2006 to 1 in 2013, *Festuca ovina/rubra* reduced from 6 to 4, *Galium saxatile* increased from 3 to 5. Vegetation height has remained more or less constant although *Calluna vulgaris* was reduced from 7cm in 2006 to 3.5cm in 2013.
**Bryophytes**-All species found in 2006 were still present, however cover of *Hypnum jutlandicum* has reduced from 7 to 3. *Racomitrium languinosum* was a new record.

Reasons for change
This quadrat is largely unchanged from 2006.

02 IN 5 x 5m Side Wood
**Vascular plants**-All species were re-found with one addition, *Hyacinthoides non-scriptus*. There were no significant changes in cover. The *Sorbus aucuparia* and *Quercus petraea* seedlings/saplings have grown but not increased in cover. Height of other vegetation was found to be largely the same.
**Bryophytes**-*Isothecium myosuroides, Rhytidiadelphus triquetrus, Pseudoscleropodium purum* and *Diplophyllum albicans* were not re-found, however *Dicranum scoparium* and *Pleurozium schreberi* were new records. Cover of *Hylocomium splendens* was reduced from 5 to 2, *Hypnum jutlandicum* from 3 to 1, *Plagiothecium undulatum* from 3 to 1, and *Scapania gracilis* from 3 to 1.

Reasons for change
*Hyacinthoides non-scriptus* was probably present in 2006 but not found due to the later survey date. Whilst the saplings had grown, they are probably being suppressed by shade. N.B. The exclosure in which the quadrat is located is no longer stockproof. Wool was noted and one of the Sorbus saplings had been frayed by deer.

02 OUT 5 x 5m Side Wood

**Vascular plants**-All species recorded in 2006 were re-found in 2013. New records for this quadrat were *Conopodium majus, Crataegus monogyna, Cirsium sp*, *Potentilla erecta, Luzula multiflora, Oreopteris limbosperma* and *Fraxinus excelsior*. Cover of *Pteridium aquilinum* was reduced from 4 in 2006 to 2 in 2013, whilst *Vaccinium myrtillus* cover increased from 3 to 5, but otherwise cover was largely the same.

**Bryophytes**- *Dicranella heteromalla* and *Mnium hornum* were not refound*. Cephalozia bicuspidata* and *Rhizomnium punctata* were new records.

Reasons for change

The decrease in cover of *Pteridium aquilinum* may be due to increased shading from the tree canopy.

03 IN 1 x 1m Silver Cove Cattle Grazing site (open)

**Vascular plants**-*Agrostis canina, Carex viridula ssp oedocarpa, Festuca ovina/rubra* and *Oxalis acetosella* were not recorded in 2013. The *Picea sitchensis* seedling recorded in 2006 is now a 3 metre sapling which dominates the quadrat (cover 1 in 2006, 10 in 2013). Cover of *Calluna vulgaris* has also increased significantly from 3 to 9, with height also increasing from 37cm to 70cm. The 6 *Sorbus aucuparia* seedlings of 2006 (cover 2, height 27cm-66cm) have become 5 saplings (cover 5, height 2 metres). Cover *of Deschampsia flexuosa* has reduced from 9 to 2.

**Bryophytes**- *Sphagnum tenellum*, *Polytrichum commune* and *Diplophyllum albicans* were not recorded in 2013, however *Sphagnum quinquefarium, S. russowii* and *Lophocolea bidentata* were new records. Cover of *Rhytidiadelphus loreus* was reduced from 5 to 2.

Reasons for change

The exclosure in which the quadrat is located is developing into a spruce/rowan thicket as a result of no grazing. See Photo 17.

03 OUT 1 x 1m Silver Cove Cattle Grazing site (open)

**Vascular plants**-*Festuca ovina/rubra*, *Betula sp* and *Sorbus aucuparia* were not found in 2013. *Carex binervis, Dryopteris dilatata, Picea sitchensis* and *Vaccinium myrtillus* were all new records. *Calluna vulgaris* had the same cover in both surveys but the plant was dead in 2013. Cover of *Agrostis canina* increased from 4 in 2006 to 7 in 2013, whilst cover of *Deschampsia flexuosa* was reduced from 8 to 6.

**Bryophytes**-*Lophozia ventricosa* was not re-found in 2013, however *Dicranum majus, Pleurozium schreberi, Thuidium tamarisciunum, Barbilophozia floerkei* and *Diplophyllum albicans* were new records . Cover *of Polytrichum commune/P.formosum* was reduced from 3 in 2006 to 1 in 2013.

**Rock/Bare ground**-Cover reduced from 4 in 2006 to 1 in 2013.

Reasons for change

*Sorbus aucuparia* and *Betula* seedlings appear to have been browsed off. The increase in bryophyte species probably just reflects natural colonisation of a relatively recent clearfell, possibly with increasing humidity as the adjacent exclosure develops into woodland.

04 IN 5 x 5m Silver Cove cattle grazed site (wooded)
**Vascular plants**-*Festuca ovina/rubra* and *Oxalis acetosella* were not re-found, however *Dryopteris dilatata* and *Picea sitchensis* were new records. Cover was found to be largely the same as in 2006, however *Vaccinium myrtillus* had increased from 4 to 6 whilst *Anthoxanthum odoratum* had reduced from 4 to 2. The *Sorbus aucuparia* saplings had increased significantly in height (from 10-80cm in 2006 to 35-300cm in 2013) and *Vaccinium myrtillus* had also increased in height from 21cm to 30cm.
**Bryophytes**- *Pseudotaxiphyllum elegans* and *Scapania nemorea* were not re-found however *Dicranum majus, Dicranum scoparium, Polytrichum commune/P. formosum, Rhytidiadelphus loreus, Sphagnum palustre/papillosum, Barbilophozia floerkei* and *Scapania gracilis* were new records. There were significant decreases in cover for a number of mosses; *Hypnum jutlandicum* (from 4 to 2), *Plagiothecium undulatum* (from 5 to 3), *Pleurozium schreberi* (from 7 to 2), *Pseudoscleropodium purum* (from 4 to 2) *Rhytidiadelphus squarrosus* (from 8 to 3) and *Thuidium tamariscinum* (from 3 to 1)

Reasons for change
There has been a definite response to the exclusion of grazing. The vegetation has become thick and spongy with bryophytes now obscuring fallen trees and stumps (compare Photos 19,20 and 21), and *Vaccinium* and *Sorbus* have grown significantly.

04 OUT 5m x 5m Silver Cove Cattle Grazing site (wooded)
**Vascular plants**-No loss of species, however six new species were recorded in 2013;*Betula sp, Blechnum spicant, Carex pilulifera, Dryopteris dilatata, Oxalis acetosella* and *Picea sitchensis*. For species recorded in both surveys, cover remained largely the same, the only change being *Festuca ovina/rubra* which reduced from 4 to 2. Vegetation measurements show that *Calluna vulgaris* reduced from an average of 26cm in 2006 to 14cm in 2013, and *Vaccinium myrtillus* from 25cm to 14cm. Whilst the number of *Sorbus aucuparia* seedlings/saplings increased from 3 to 8, the height range reduced from 20-52cm in 2006 to 7-40cm in 2013.
**Bryophytes**-*Sphagnum tenellum , Barbilophozia floerkei* and *Lophocolea bidentata* were not recorded in 2013. *Sphagum palustre/ papillosum, S. quinquefarium , Campylopus flexuosus , Pseudotaxiphyllum elegans* and *Scapania gracilis* were new records. There was a significant decrease in cover of *Pleurozium schreberi* (from 5 to 1), *Pseudoscleropodium purum* ( from 5 to 2) , *Rhytidiadelphus squarrosus* ( from 8 to 3) and *Scapania nemorea* ( from 3 to 1).

Reasons for change
The reduced height of *Calluna, Vaccinium* and *Sorbus* suggests deer browsing and cattle grazing .

05A IN 1x1 Silver Cove
**Vascular plants**-*Huperzia selago* was not re-found. No new species were recorded. Cover of *Nardus stricta* has reduced from 7 to 3, *Carex pilulifera* from 6 to 2 and *Vaccinium myrtillus* from 3 to 1. Cover of *Narthecium ossifragum* has increased from 3 to 5. Elsewhere in the exclosure *Calluna vulgaris* was developing well, *Empetrum nigrum* was present and *Narthecium ossifragum* was flowering.
**Bryophytes**- *Hylocomium splendens , Hypnum jutlandicum* and *Rhytidiadelphus squarrosus* were not re-found , however *Sphagnum* was a new record.

Reasons for change
In the absence of grazing a dense thatch has developed. This has probably resulted in the loss of *Huperzia selago* and the reduction of cover of *Nardus stricta* and *Carex pilulifera*.

05A OUT 1x1 Silver Cove

**Vascular Plants-** *Agrostis capillaris* was not re-found. Otherwise there was no significant change in species and cover between 2006 and 2013. There was a significant reduction in height for *Calluna vulgaris* from 13cm to 7cm and a lesser reduction for *Vaccinium myrtillus* from 8cm to 5cm.
**Bryophytes-***Polytrichum commune*, and *Pleurozium schreberi* were new records. Two species showed a reduction in cover; *Hypnum jutlandicum* (from 3 to 1) and *Diplophyllum albicans* (from 3 to 1).

Reasons for change

The reduction of height of ericoids suggests that grazing pressure may be heavier than in 2006. This may be because sheep are drawn to the adjacent exclosure.

05B IN 1x1 Little Gowder Crag

**Vascular Plants-***Huperzia selago* and *Agrostis canina* were not re-found in the quadrat however were present elsewhere within the exclosure . *Deschampsia flexuosa,* which was not recorded in 2006, had a cover of 5 in 2013, however, there had been a reduction of cover for *Festuca ovina/rubra* from 9 in 2006 to 4 in 2013. Cover of *Galium saxatile* was reduced from 4 to 1. Vegetation height has increased; *Festuca ovina/ rubra* increasing from 4cm/ 17cm(leaves/inflorescence) to 17cm/27cm and *Vaccinium myrtillus* increasing from 3cm to 11cm.
**Bryophytes-***Diplophyllum albicans* was not re-found. Cover of *Polytrichum commune* increased from 5 in 2006 to 8 in 2013 and *Hypnum jutlandicum* reduced from 3 to 1.

Reasons for change

In the absence of grazing the vegetation has become luxuriant and spongy. This may be the cause for the loss of *Huperzia selago*. Heavy grazing may have led to *Deschampsia flexuosa* being overlooked in 2006.

05B OUT 1x1 Little Gowder Crag

**Vascular plants-**There was no change in species between 2006 and 2013. Cover of *Festuca ovina/ rubra* decreased from 9 to 5 whilst the cover of following species increased; *Agrostis canina* (from 3 to 5), *Diphasiastrum alpinum* ( from 3 to 4) , *Potentilla erecta* ( from 2 to 4) and *Vaccinium myrtillus* ( from 3 to 5). There was little change in vegetation height. *Diphasiastrum* was being uprooted by grazing sheep.
**Bryophytes-***Rhytidiadelphus loreus* was not re-found.

Reasons for change

Although the results suggest little change, the presence of the exclosure fence appears to be attracting and concentrating sheep to the area resulting in increased grazing and trampling in this quadrat. See photos 43 to 46.

06 IN 1x1 Dubs Quarry

**Vascular plants-***Carex pilulifera , Digitalis purpurea* and *Juncus squarrosus* were not re-found. *Deschampsia cespitosa* and *D. flexuosa* were new records. Cover of *Agrostis capillaris* reduced from 8 to 4 whilst *Festuca ovina/ rubra* increased from 2 to 4 and *Vaccinium myrtillus* from 1 to 4. *Calluna vulgaris* increased in height from 20cm to 35cm.

**Bryophytes-***Campylopus flexuosus* and *Dicranella heteromalla* were not re-found but *Kindbergia (Eurhynchium) praelongum* was a new record. *Polytrichum commune/ P. formosum* increased in cover from 2 to 4.

**Rocks and bare ground-**There were no rocks or bare ground visible in 2013 (cover in 2006; rocks-4, bare ground-1).

Reasons for change

In 2006 this was a recent clearfell. The quadrat has now become completely vegetated. Early colonisers such as *Digitalis purpurea* and *Juncus squarrosus* have been lost as the vegetation has developed .

06 IN 5x5 Dubs Quarry

**Vascular plants-***Carex pilulifera, C. viridula ssp . oedocarpa, Cerastium fontanum , Digitalis purpurea, Senecio jacobea* and *Epilobium brunnescens* were not re-found. *Betula* sp and *Sorbus aucuparia* were new records. Cover of most species was similar between 2006 and 2013, however, *Deschampsia cespitosa* increased from 2 to 7 and *D. flexuosa* from 4 to 7. *Calluna vulgaris* increased in height from 24cm in 2006 to 38cm in 2013.

**Bryophytes-***Dicranella heteromalla, Dicranum scoparium* and *Pogonatum urnigerum* were not re-found. But *Kinbergia ( Eurhynchium) praelongum , Pleurozium schreberi* and *Rhytidiadelphus squarrosus* were new records.

**Tree stumps, bare ground and rock-**whilst the cover of tree stumps and brash has remained the same the cover of rock reduced from 3 to 1 and bare ground was no longer present.

Reasons for change

In 2006 this was a recent clearfell. *Cerastium fontanum Senecio jacobea ,Digitalis purpurea* and *Epilobium brunnescens* are early colonisers of open ground which have been lost as the vegetation cover has increased, and seedlings of *Betula* and *Sorbus* have appeared.

06 OUT 1x1 Dubs Quarry

**Vascular plants-***Betula sp , Calluna vulgaris* and *Vaccinium myrtillus* were not present in 2013 but *Holcus lanatus* was a new record. Cover of *Festuca ovina/ rubra* was reduced from 6 to 2, *Juncus squarrosus* from 4 to 2, but *Galium saxatile* increased from 4 to 6. Vegetation heights were broadly similar to 2006.

**Bryophytes-** *Rhytidiadelphus squarrosus* was a new record. Cover of *Polytrichum commune/P. formosum* reduced from 6 to 3.

Reasons for change

See 06 OUT 5x5.

06 OUT 5x5 Dubs Quarry.
**Vascular plants-***Carex viridula ssp oedocarpa , Chamerion angustifolium* and *Digitalis purpurea* were not re-found. *Anthoxanthum odoratum , Dryopteris borreri , Holcus lanatus* and *Sorbus aucuparia* were new records. Cover of *Galium saxatile* increased from 4 to 7 , *Carex binervis* from 3 to 5 and *Deschampsia flexuosa* from 6 to 8 and *Picea sitchensis* from 1 to 3. Cover of *Festuca ovina/rubra* reduced from 5 to 3.The *Picea sitchensis* seedling (36cm in 2006) has become a 200cm sapling, whilst *Calluna vulgaris* has increased in height from 20cm to 35cm.
**Bryophytes-***Hylocomium splendens* and *Pseudotaxiphyllum elegans* were not re-found. *Campylopus flexuosus* and *C. introflexus* were new records.
**Tree stumps, bare ground and rock-**Whilst the cover of tree stumps and brash has remained the same the cover of rock has reduced from 3 to 1.

Reasons for change
The vegetation is responding to clearfelling. Early colonisers such as *Chamerion angustifolium* and *Digitalis purpurea* have been lost . *Sorbus aucuaparia* has become established ( 2 seedlings) together with a *Picea sitchensis* sapling. Although open to grazing, this does not appear to be affecting the vegetation with *Calluna* increasing in height and tree seedlings/saplings becoming established .

07 No exclosure 1x1 Upper Valley South side
**Vascular plants-***Carex binervis, C.pilulifera* and *Digitalis purpurea* were not present in 2013, however *Deschampsia cespitosa, D. flexuosa ,Galium saxatile ,Holcus lanatus* and *Vaccinium myrtillus* were new records. Cover of *Agrostis canina* increased from 2 to 4 and *Calluna vulgaris* from 1 to 5 whilst *Festuca ovina/ rubra* reduced from 4 to 2. Height of *Calluna* increased from 7cm in 2006 to 25cm in 2013.
**Bryophytes-***Campylopus flexuosus, Hypnum jutlandicum* and *Plagiothecium undulatum* were not re-found, but *Rhytidiadelphus squarrosus* was a new record. Cover of *Polytrichum commune / P.formosum* reduced from 5 to 3.
**Rocks and bare ground-**No bare ground or rocks were present in 2013.

Reasons for change
See 07 No exclosure 5x5 Upper Valley South side

07 No exclosure 5x5 Upper Valley South side
**Vascular plants-***Digitalis purpurea* and *Festuca vivipara* were not re-found. *Erica cinerea, Holcus lanatus* and *Potentilla erecta* were new records. There has been significant change in cover for several species; *Deschampsia flexuosa* increased from 4 to 7*, Luzula multiflora* from 1 to 3, *Picea sitchensis* from 1 to 3 and *Calluna vulgaris* from 3 to 5 whilst *Carex piluifera* reduced from 7 to 1.The one *Picea sitchensis* seedling in 2006 (20cm) has become 4 saplings (20-200cm), Whilst the 12 planted Quercus sp(height 2006 25-48cm) have reduced to four saplings (height 2013 10-30cm).
**Bryophytes-***Campylopus introflexus* and *Dicranella heteromalla* were not re-found whilst *Rhtidiadelphus squarrosus, Nowellia curvifolia, Lepidozia reptans* and *Diplophyllum albicans* were new records.
**Rocks,Bare Ground and Tree Stumps-**Cover of rock/ bare ground has reduced from 4 to 1.Cover of trees stumps and brash has reduced from 3 to 1

Reasons for change
In 2006 this was a recent clearfell which had just been restocked with broadleaves. The increase in cover and new species recorded in 2013 reflect natural colonisation and spread of vegetation.

08 IN 1x1 River Liza upper bend

**Vascular plants-***Calluna vulgaris, Juncus squarrosus, Picea sitchensis* and *Pinus sylvestris* have been lost. *Luzula multiflora, Nardus stricta* and *Vaccinium myrtillus* are new records. *Molinia caerulea* has significantly increased in cover from 2 to 5 whilst *Deschampsia flexuosa* has decreased from 9 to 4.
**Bryophytes-***Hypnum jutlandicum* and *Sphagnum papillosum/ palustre* are new records. Cover of *Polytrichum commune/ P. formosum* reduced from 7 to 4.

Reasons for change
See 08 IN 5x5

08 IN 5x5 River Liza upper bend
**Vascular plants-***Juncus conglomeratus* and *Potentilla erecta* were not re-found. *Agrostis canina, Betula sp , Chamerion angustifolium , Galium saxatile* and *Nardus stricta* were new records. Cover of *Picea sitchensis* increased from 2 to 4 with three saplings now 200cm tall. The *Pinus sylvestris* has grown from 39cm in 2006 to 100-200cm in 2013. *Calluna vulgaris* has increased in height from 32 to 45cm.
**Bryophytes-***Brachythecium rutabulum , Dicranella heteromalla* and *Nardia scalaris* were not re-found, however seven new species were recorded; *Atrichium undulatum , Hylocomium splendens, Pseudotaxiphyllum elegans , Rhytidiadelphus squarrosus, Sphagnum papillosum/ palustre , Diplophyllum albicans* and *Lophocolea bidentata*.
**Bare rock and tree stumps-**The cover of tree stumps and brash has reduced from 3 to 1 and rock from 2 to 1.

Reasons for change
With the exclusion of deer and livestock this is becoming a thicket stage area of conifer. The increase in bryophyte species is probably due to the moist microclimate which is developing as the trees become established.

08 OUT 1x1 River Liza upper bend
**Vascular plants-***Festuca ovina/ rubra* and J*uncus squarrosus* have been lost but *Agrostis capillaris*, fern sp , *Galium saxatile, Luzula mulitflora* and *Potentilla erecta* are new records. There has been a significant reduction in cover of *Calluna vulgaris* from 8 to 3 concomitant with a decrease in height from 45cm in 2006 to 7cm in 2013 (See photo70 & 71). Cover of *Carex echinata* has increased from 2 to 4 and C. panicea from 3 to 4.
**Bryophytes-***Barbilophozia floerkei* and *Diplophyllum albicans* were not re-found whilst *Hypnum jutlandicum* and *Campylopus flexuosus* were new records. Cover of *Polytrichum/ P. formosum* reduced from 5 to 3.

Reasons for change
See 08 OUT 5x5

08 OUT 5x5 River Liza upper bend
**Vascular plants-***Athyrium felix-femina, Blechnum spicant , Chamerion angustifolium, Deschampsia cespitosa* and *Rumex acetosella* were not re-found. *Dryopteris borreri , Galium saxatile, Luzula multiflora* and *Nardus stricta* were new records. Cover of four species had reduced significantly; *Calluna vulgaris* from 5 to 3 *Carex echinata* from 3 to 1, *Deschampsia flexuosa* from 8 to 5, *Dryopteris dilitata* from 3 to 1. The three seedlings of *Picea sitchensis* with a cover of 1 in 2006 (height 22-53cm) have become two saplings with a cover of 2 with a height of 30-150cm.
**Bryophytes-** *Dicranella heteromalla, Kindbergia ( Eurhynchium) praelongum* and *Plagiothecium undulatum* were not re-found. *Dicranum scoparium, Rhytidiadelphus loreus*, *Sphagnum inundatum* and *Lophocolea bidentata* were new records.

Reasons for change
This quadrat is located on a route used by cattle where they are funnelled between the river and the deer fence/ stock fence. There is therefore a high level of disturbance which has contributed to the reduction of cover of several species.

09 No exclosure 1x1 Northern Fell Fence
**Vascular plants-**Seven new species were recorded in 2013; *Agrostis capillaris, Anthoxanthum odoratum, Carex binervis, Digitalis purpurea, Galium saxatile, Holcus lanatus* and *Vaccinium myrtillus.* Cover of *Calluna vulgaris* decreased from 3 to 1 and *Deschampsia flexuosa* from 7 to 5 whilst *Festuca ovina/ rubra* increased from 3 to 5.
**Bryophytes-***Polytrichum juniperinum* was not re-found. Five new species were recorded; *Pogonatum urnigerum*, *Polytrichum commune/ P. formosum, Rhytidiadelphus squarrosus,* and *Hylocomium splendens* .
**Bare ground and rock-**The cover of bare ground had reduced from 8 to 4 and rock from 4 to 1.

Reasons for change
See 09 No exclosure 5x5

09 No exclosure 5x5 Northern Fell Fence
**Vascular plants-**The number of vascular plant species recorded increased from 7 in 2006 to 17 in 2013. *Agrostis capillaris, Anthoxanthum odoratum, Carex binervis, Cerastium fontanum, Digitalis purpurea, Holcus lanatus, Juncus effusus, Juncus squarrosus, Luzula multiflora, Nardus stricta* and *Rumex acetosella* were all new records. *Senecio vulgaris* was not re-found. Cover of *Calluna vulgaris* decreased from 3 to 1 and *Deschampsia flexuosa* from 7 to 5 whilst *Festuca ovina / rubra* increased from 3 to 5. There has been little change in vegetation heights.
**Bryophytes-** Five new species were recorded in 2013; *Hylocomium splendens, Pogonatum urnigerum, Polytrichum commune/ P. formosum, Rhytidiadelphus loreus* and *Rhytidiadelphus squarrosus* whilst *Hypnum jutlandicum* and *Polytrichum juniperinum* were not re-found. *Cladonia s*p was also new in 2013.
**Rocks, bare ground and tree stumps and brash-**The cover of bare ground reduced from 8 to 1

Reasons for change
In 2006 this was a recently felled spruce plantation with significant bare ground and very few species present. The changes reflect natural colonisation. Sheep are using a quadrat marker post for rubbing and this is causing localised trampling and grazing within the 1x1 quadrat.

10A Cattle 1x1 Ennerdale Water shore (cattle)
**Vascular plants-** *Pedicularis sylvatica* and *Calluna vulgaris* were new records. Cover of *Trichophorum cespitosum* reduced from 4 in 2006 to 1 in 2013 whilst *Drosera rotundifolia* increased from 1 to 3. Heights have remained unchanged.
**Bryophytes-***Sphagnum papillosum / palustre* is a new species for 2013 whilst *Racomitrium aciculare* was not re-found.
**Rock and bare ground-** Cover of bare ground and rock has remained the same.

Reasons for change
There has been little change within this quadrat, however since 2006 there appears to have been some erosion of the shoreline below the quadrat which may have made the vegetation within the quadrat more exposed to wave action.(See photos 85 to 87).

10B No Cattle 1x1 Ennerdale Water shore (no cattle)
**Vascular Plants-** *Littorela uniflora* and *Carex echinata* are new records for this quadrat. Cover of *Molinia caerulea* has decreased from 7 to 4, *Nardus stricta* from 7 to 5, *Carex viridula ssp oedocarpa* from 4 to 1 whilst *Drosera rotundifolia* has increased from 1 to 3. The height of *Molinia* decreased from 16cm (leaves)/ 30 cm (inflorescence) to 7cm for leaves (no inflorescences present at time of survey).
**Bryophytes-** *Hylocomium armoricum*, *Rhytidiadelphus squarrosus, Nardia scalaris* and *Scapania undulata* were not re-found. Cover of *Campylopus atrovirens* had reduced from 2 to 1 and *Polytrichum commune* from 3 to 1,

Reason for change
There appears to have been some erosion of the shoreline below the quadrat which may have made the vegetation within the quadrat more exposed to wave action. The vegetation could also be affected by grazing by geese (feathers and droppings present in 2013).The height of the *Molinia* probably reflects the earlier date of survey in 2013. NB Cattle are now present in this area (see Recommendations).

# 4. Recommendations

**Repair of Exclosures**
The exclosures at 01 (Iron Crag) and 02 (Side Wood) are no longer stockproof. At 01 the entire 25m x 25m exclosure needs replacing (i.e. 100m of stock netting and barbed wire plus c 28 posts). At 02 a birch tree has fallen on one side of the exclosure. All other exclosures are functioning but should be checked periodically.

**Avoidance of edge effects**
In 2006 quadrats were set up 1.0m, 1.5m or 2.0m from the exclosures to avoid edge effects. Quadrats 01-OUT-1x1, 03-OUT-1x1, 05B-OUT-1x1, 08-OUT-1x1, and 08-OUT-5x5 were all found to have been affected by the livestock congregating around the exclosures or by being funnelled by the exclosure fence (08-OUT-1x1, and 08-OUT-5x5). In 09 the stob marking the corner of both the 1x1m and 5x5m quadrats is being used as a rubbing post by sheep. It may be worth moving quadrats 01-OUT-1x1 and , 05B-OUT-1x1 further away from the exclosure fences. Because of the proximity of the river, it would not be possible to move 08-OUT-1x1 and 08-OUT-5x5 further away from the fence. It is suggested that this quadrat be re-located to another side of the deer fenced exclosure to avoid trampling caused by the pinch point between the fence and the river.
In the next five to ten years, a fast growing spruce tree in Quadrat 03-IN-1x1 will begin to affect the vegetation in the adjacent quadrat (03-OUT-1x1). It is suggested that a new 03-OUT-1x1 plot be established at least 5 to 10m away from the exclosure fence to avoid this edge effect.

**Recording vegetation heights**
The specification required height measurements for 'significant' species. This was interpreted as species with the greatest cover within each quadrat. In some cases these were different from the species considered significant in 2006, so where possible measurements were obtained for the same species as in 2006 as well as those with the greatest cover to allow comparisons between surveys. It may be more useful in future if height data is collected for key indicators such as heather, bilberry, tree seedlings, together with average sward height and inflorescence height for all grasses.

**Vegetation Cover**
In addition to recording cover for individual species it may be useful to record vegetation cover at a more general level e.g. cover of bryophytes, grasses, trees. This may give a better picture of broad changes in the vegetation.

**Quadrat size**
Although they take longer to survey, 5m x 5m quadrats give a more representative picture of the vegetation in an area than 1m x 1m quadrats. They have a greater diversity of species and are less prone to localised effects. Several of the 5x5m quadrats have 1x1m quadrats nested within them ( 06, 07,08 and 09). It was felt that these 1x1m quadrats could be dropped in future surveys, with time and effort better re-directed to establishing and surveying additional quadrats.

**Accessibility**
03-IN-1x1 . In 2013 this quadrat was dominated by a single fast growing spruce sapling. It may not be physically possible to re-survey this quadrat next time!

09-No exclosure-1x1 and 5x5. These quadrats are located high up on the northern fell side near the fence. There is no path nearby. As trees become established in this area, locating the plot and accessing it will become more difficult. A route to the site may have to be cleared and marked. Given the difficult access, it may be sensible to relocate this quadrat, or to establish another one nearby to

make the climb more worthwhile. Consideration should be given to establishing another 5m x 5m quadrat above the fell fence in an area which has never been under forestry as a control.

**Cattle grazing**

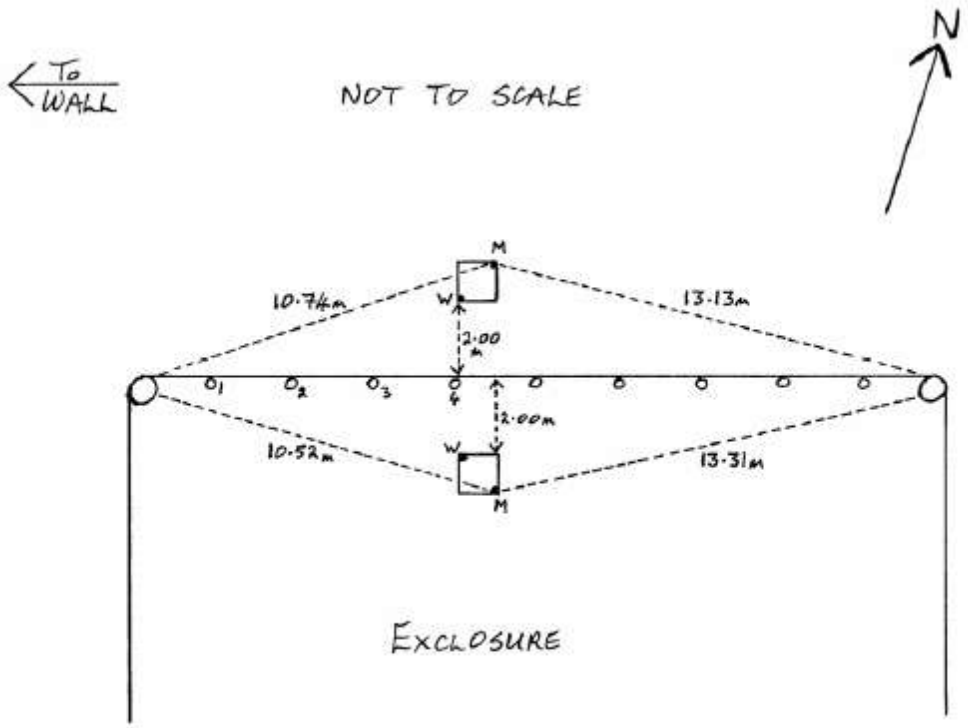
In 2006 quadrats 10A-Cattle-1x1 and 10B-NoCattle-1x1 on the Ennerdale lake shore were set up to compare cattle grazed and non-cattle grazed vegetation. In 2013 cattle were grazing in both compartments. Another quadrat could be established on the lake shore within Side Wood which is not grazed by cattle so that a meaningful comparison can be made

**Timing of survey**

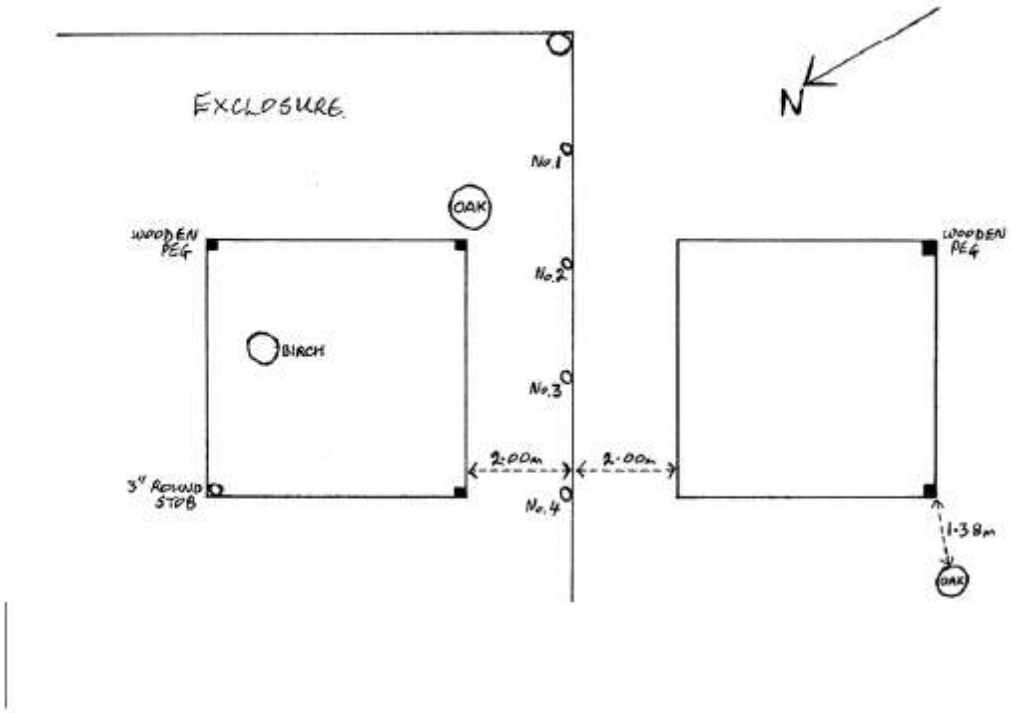
In 2006, the survey work was carried between mid August and early September. In 2013, the contract was let in May with a deadline of mid August, so some of the survey work was carried out in June and July. It is recommended that future re-surveys should be carried out in August to give consistency and allow meaningful comparison of data.

## 5. Quadrat Information Sheets

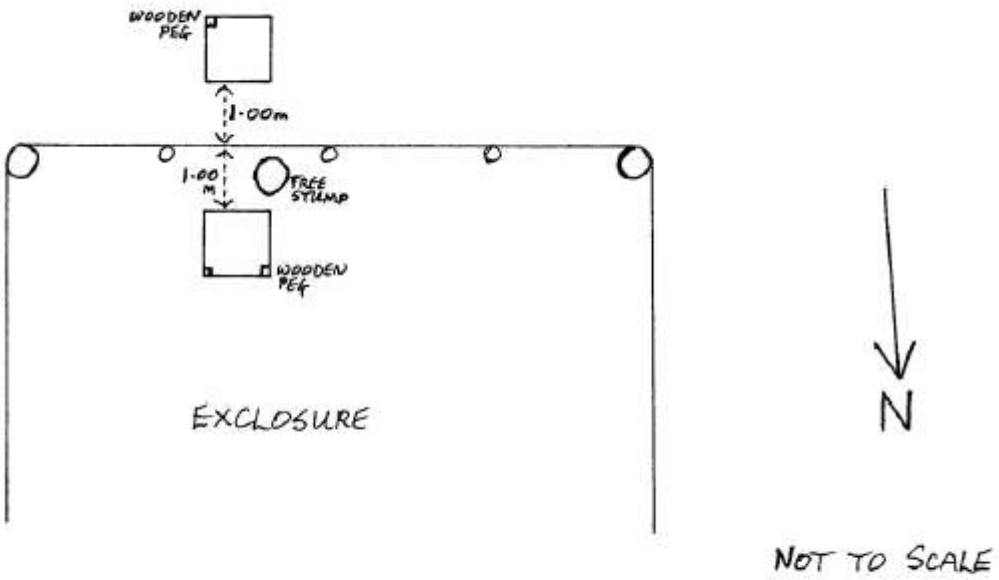
| | | |
|---|---|---|
| Site Reference number | 01 | |
| Site Name | Iron Crag | |
| Location | On top of fell above Iron Crag | |
| Quadrat reference | 2 Quadrats **01-IN-1x1** & **01-OUT-1x1** | |
| Grid Reference | NY 12182 12191 | |
| Altitude | 632m | |
| Size of Quadrat | 1m x 1m | |
| Alignment of Quadrat | Parallel & 90° to NW side of exclosure fence | |
| Location of pegs | **01-IN-1x1**<br>E corner – metal ground marker<br>W corner- wooden peg<br>S&N corner- no peg/marker | **01-OUT-1x1**<br>N corner -metal ground marker<br>S corner- wooden peg<br>E&W corner – no peg/marker |
| Distance from exclosure | 2m from exclosure fence | |



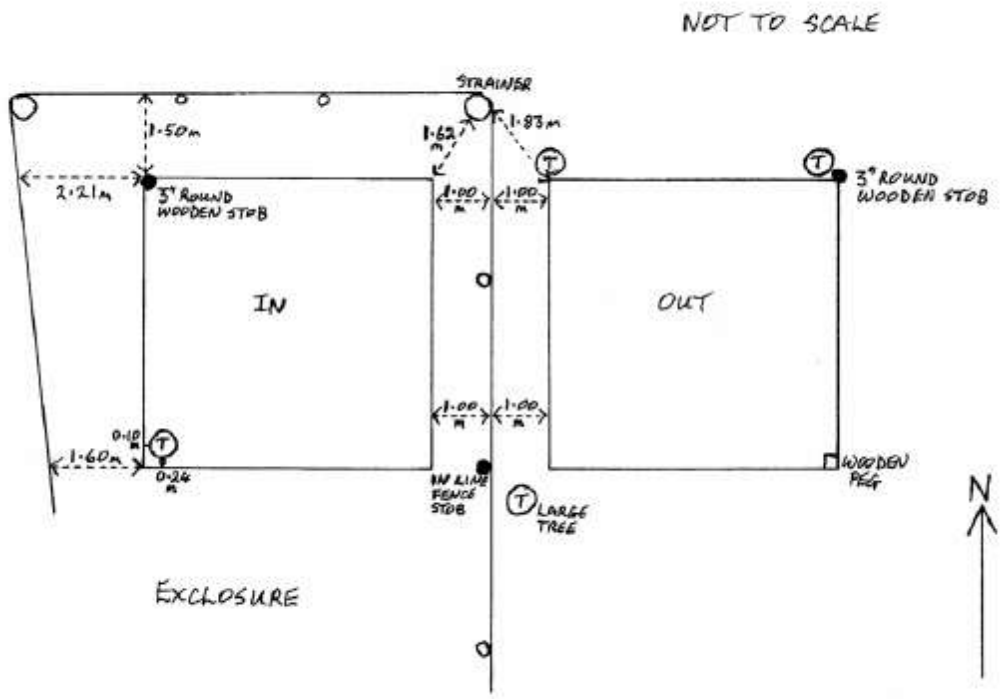
| | | |
|---|---|---|
| Site Reference number | 02 | |
| Site Name | Side Wood | |
| Location | Broadleaved woodland south side of Ennerdale Water | |
| Quadrat reference | 2 Quadrats. **02-IN-5x5 & 02-OUT-5x5** | |
| Grid Reference | NY 11965 13912 | |
| Altitude | 140m | |
| Size of Quadrat | 5m x 5m | |
| Alignment of Quadrat | Parallel and $90^0$ to exclosure fence | |
| Location of pegs | **02-IN-5x5**<br>N corner- 3" wooden stob<br>E corner –wooden peg<br>W&S corners –wooden pegs | **02-OUT-5x5**<br>S corner- wooden peg<br>W corner –wooden peg<br>N&E corners- no pegs |
| Distance from exclosure | 2m from exclosure fence | |



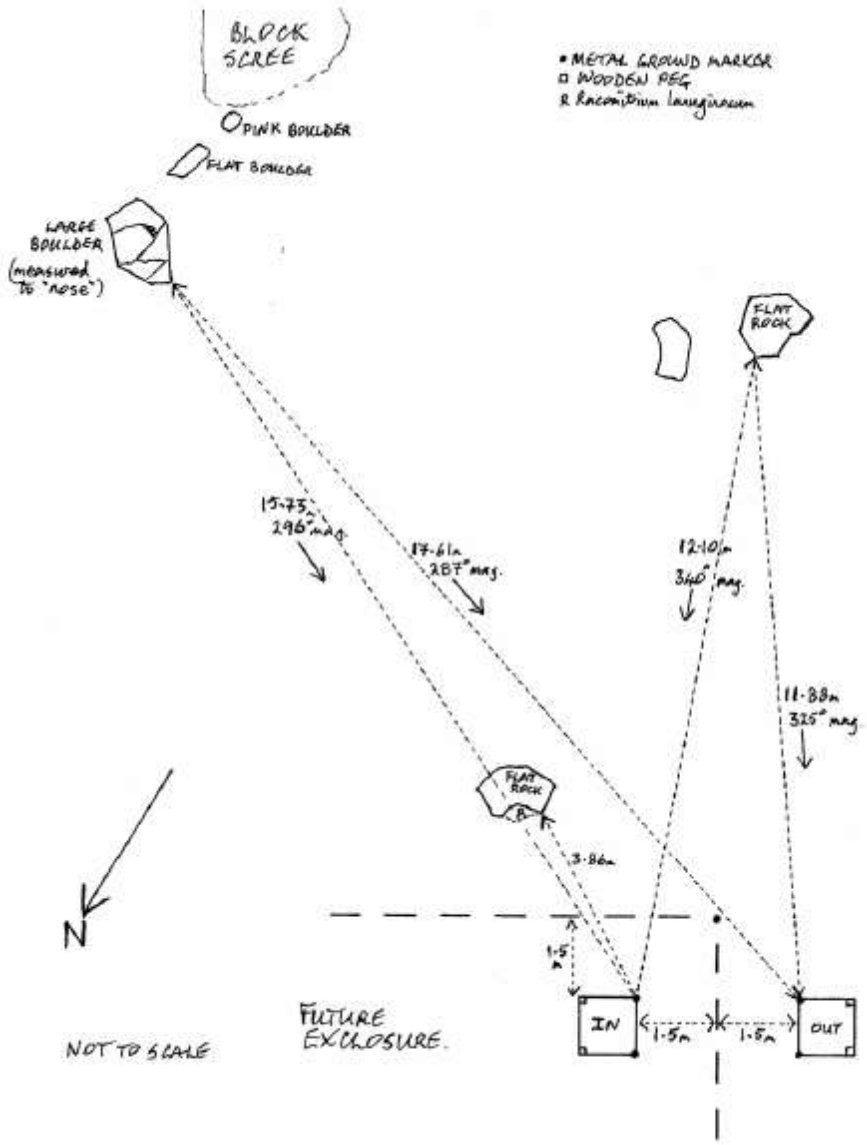
| | | |
|---|---|---|
| Site Reference number | 03 | |
| Site Name | Silver Cove cattle grazing site (open) | |
| Location | Open clear fell area west side of Woundell Beck | |
| Quadrat reference | 2 Quadrats. **03-IN-1x1 & 03-OUT-1x1** | |
| Grid Reference | NY13030 13527 | |
| Altitude | 145m | |
| Size of Quadrat | 1m x 1m | |
| Alignment of Quadrat | Parallel and $90^0$ to top exclosure fence | |
| Location of pegs | **03-IN-1x1**<br>NE corner-wooden peg(painted orange)<br>NW corner-wooden peg | **03-OUT-1x1**<br>SE corner- wooden peg |
| Distance from exclosure | 1m from exclosure top fence. Fence painted orange on line between IN and OUT quadrats | |



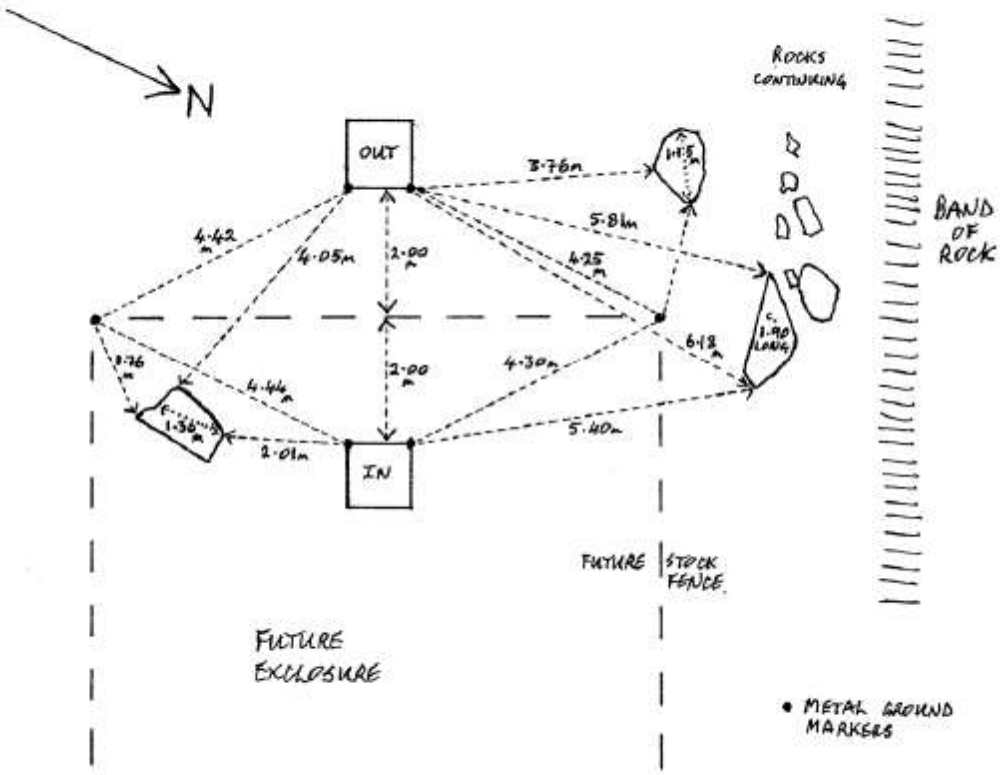
| | | |
|---|---|---|
| Site Reference number | 04 | |
| Site Name | Silver Cove cattle grazed site ( wooded) | |
| Location | In larch wood just SE of confluence of Deep Gill with Silvercove Beck | |
| Quadrat reference | 2 Quadrats **04-IN-5x5 & 04-OUT-5x5** | |
| Grid Reference | NY 13249 13304 | |
| Altitude | 197m | |
| Size of Quadrat | 5m x 5m | |
| Alignment of Quadrat | Parallel and 90° to E side of exclosure fence | |
| Location of pegs | **04-IN-5x5**<br>-NW corner- 3" rounded wooden stob (painted orange) | **04-OUT-5x5**<br>-NE corner- 3" wooden stob(painted orange<br>SE corner-wooden peg |
| Distance from exclosure | -1m from exclosure fence<br>-Exclosure fence stob 1m from SE corner, painted orange<br>-Exclosure fence 1m from NE corner, painted orange | -1m from exclosure fence<br>-Exclosure fence stob 1m from SW corner, painted orange<br>-Exclosure fence 1m from NW corner, painted orange |



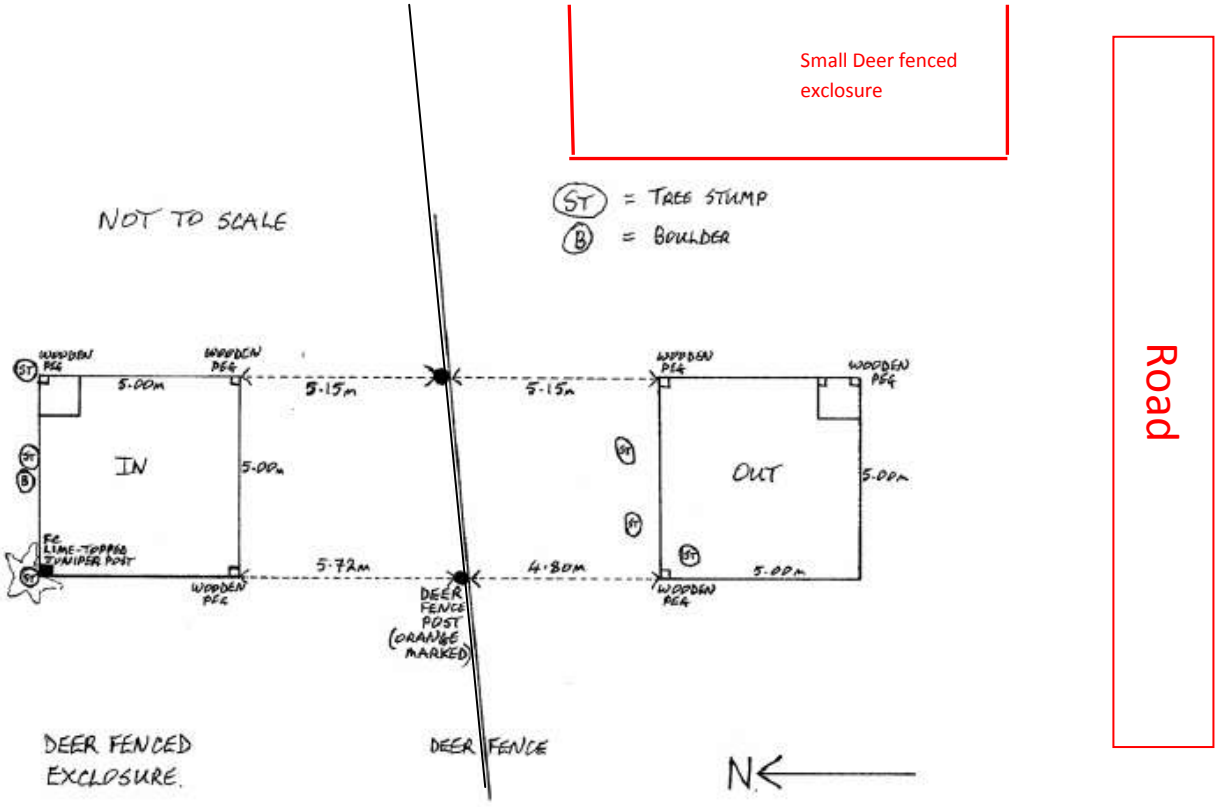
| | | |
|---|---|---|
| Site Reference number | 05A | |
| Site Name | Silver Cove | |
| Location | Head of Silver Cove | |
| Quadrat reference | 2 Quadrats **05A-IN-1x1** **&** **05B-OUT-1x1** | |
| Grid Reference | NY 13225 11232 | |
| Altitude | 605m | |
| Size of Quadrat | 1m x 1m | |
| Alignment of Quadrat | Parallel and 90° to SW side of exclosure fence | |
| Location of pegs | **05A-IN-1x1**<br>S corner-metal ground marker<br>W corner-metal ground marker<br>N corner- wooden peg<br>E corner- wooden peg | **05B-OUT-1x1**<br>N corner-metal ground marker<br>E corner-metal ground marker<br>S corner- wooden peg<br>W corner- wooden peg |
| Distance from exclosure | 1.5m from SW side of exclosure fence | |



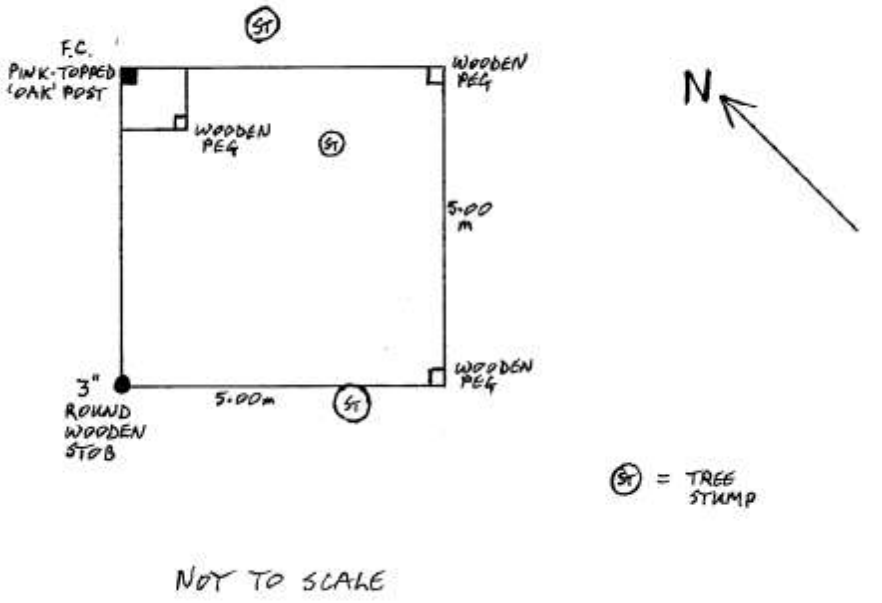
| | | |
|---|---|---|
| Site Reference number | 05B | |
| Site Name | Little Gowder Crag | |
| Location | East side of col between Little Gowder Crag and Haycock | |
| Quadrat reference | 2 Quadrats **05B-IN-1x1 & 05B-OUT-1x1** | |
| Grid Reference | NY 14269 10888 | |
| Altitude | 715m | |
| Size of Quadrat | 1m x 1m | |
| Alignment of Quadrat | Parallel and 90° to SW side of exclosure fence | |
| Location of pegs | **05B-IN-1x1**<br>S corner- wooden peg painted orange<br>W corner- wooden peg painted orange | **05B-OUT-1x1**<br>N corner-metal ground marker<br>E corner-metal ground marker |
| Distance from exclosure | 2m from SW side of exclosure fence | |



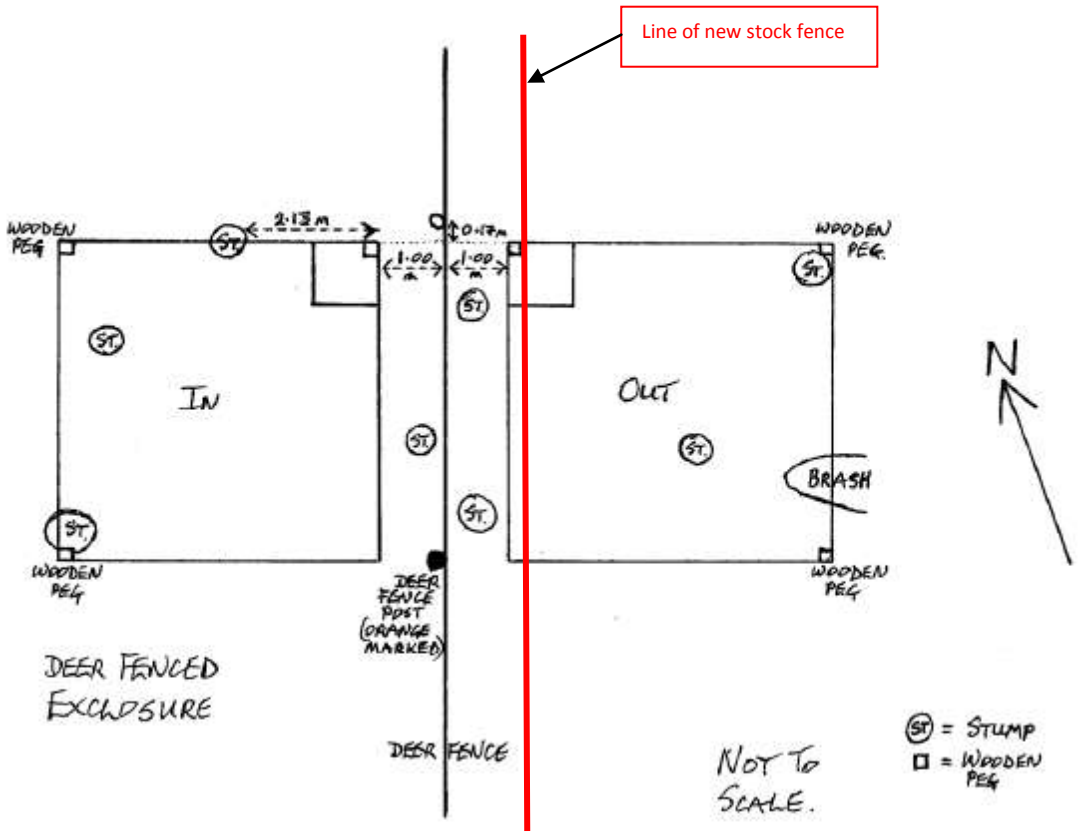
| | | |
|---|---|---|
| Site Reference number | 06 | |
| Site Name | Dubs Quarry | |
| Location | Inside and outside planted deer fenced exclosure below Dubs Quarry | |
| Quadrat reference | 4 Quadrats **06-IN-1x1** **06-OUT-1x1** **06-IN-5x5** **06-OUT-5x5** | |
| Grid Reference | NY 18479 12781 | |
| Altitude | 273m | |
| Size of Quadrat | Two 1mx1m & two 5mX5m | |
| Alignment of Quadrat | ± N-S | |
| Location of pegs | **06-IN-1x1**<br>NE corner-wooden peg by tree stump | **06-OUT-1x1**<br>SE corner-orange wooden peg<br>NE corner- orange wooden peg<br>SW corner & NW corner- no pegs |
| | **06-IN-5x5**<br>SE corner- orange wooden peg<br>SW corner - orange wooden peg<br>NE corner- - orange wooden peg by tree stump<br>NW corner- Juniper post | **06-OUT-5x5**<br>SE corner-orange wooden peg<br>NE corner -orange wooden peg<br>NW corner- orange wooden peg<br>SW corner-no peg |
| Distance from exclosure | **06-IN-1x1** –NE peg 10.15m from orange painted deer fence post | |
| | **06-IN-5x5** –SE peg 5.15m from orange painted deer fence post<br>-SW peg 5.72m from orange painted deer fence post | |
| | **06-OUT-1x1** - SE 10.15m from orange painted deer fence post | |
| | **06-OUT-5x5** -SE peg 10.15m from orange painted deer fence post<br>-NW peg 4.80m from orange painted deer fence post<br>-NE peg5.15m from orange painted deer fence post | |



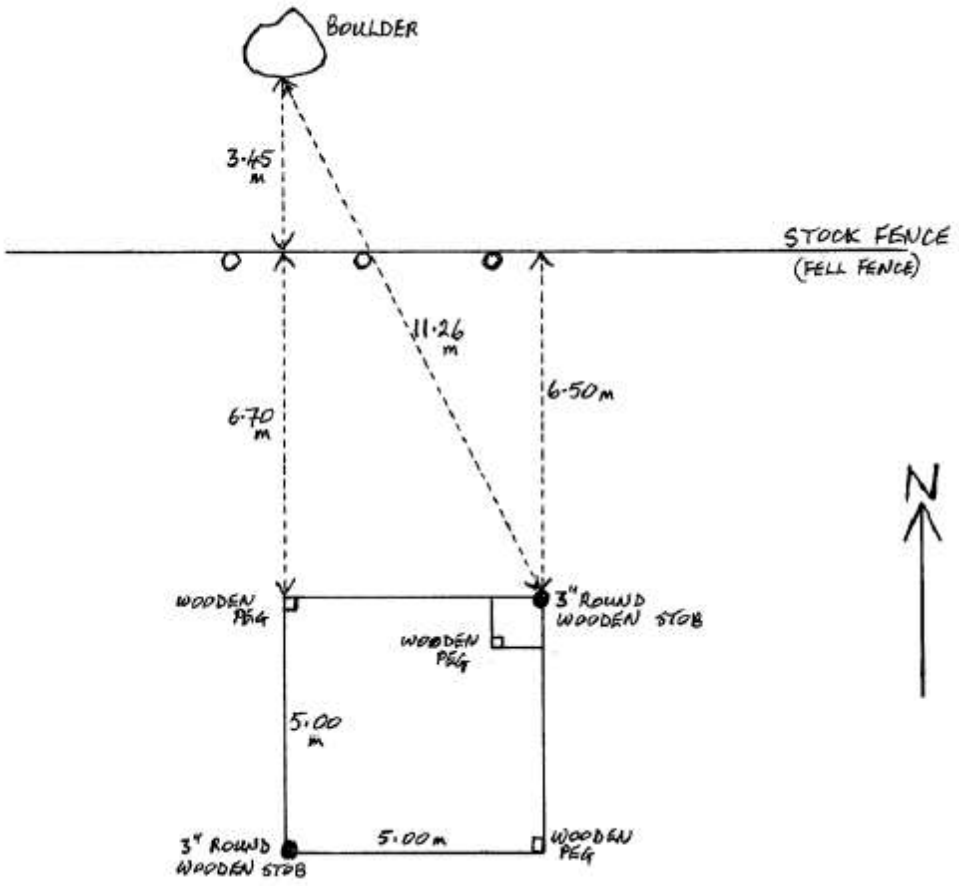
| | | |
|---|---|---|
| Site Reference number | 07 | |
| Site Name | Upper valley south side | |
| Location | Planted area within upper valley south of River Liza (not fenced) | |
| Quadrat reference | 2 Quadrats **07-NoExcl-1x1 & 07-NoExcl-5x5** | |
| Grid Reference | NY 18247 12635 | |
| Altitude | 242m | |
| Size of Quadrat | 1m x 1m & 5m x 5m | |
| Alignment of Quadrat | NW-SE & NE-SW | |
| Location of pegs | **07-NoExcl-1x1**<br>S corner-orange wooden peg<br>N corner- orange wooden peg | **07-NoExcl-5x5**<br>W corner-3" orange round stob<br>E corner- orange wooden peg<br>S corner- orange wooden peg<br>N corner- orange wooden peg |
| Distance from exclosure | Not applicable<br>1x1 is in N corner of 5m x5m quadrat | |



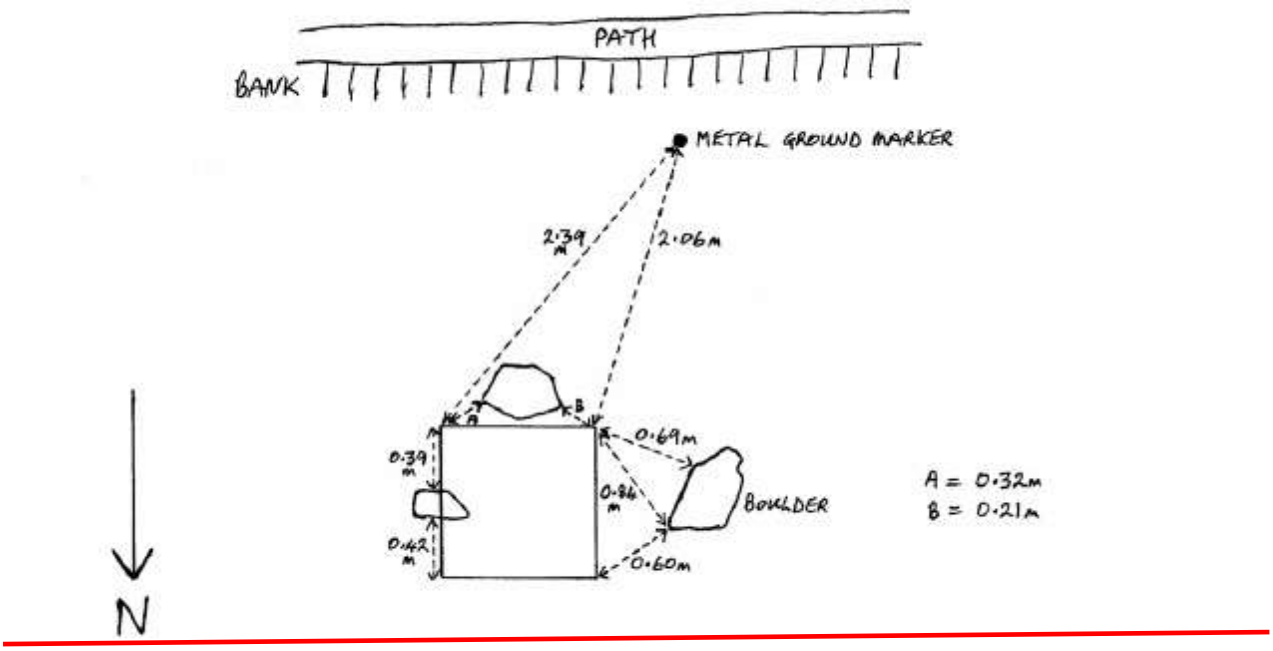
| | | |
|---|---|---|
| Site Reference number | 08 | |
| Site Name | River Liza Upper bend | |
| Location | Inside the prominent bend in the River Liza below top ford. Inside exclosure deer fence- clear felled area. | |
| Quadrat reference | 4 Quadrats **08-IN-1x1** **08-IN-5x5** **08-OUT-1x1** **08-OUT-5x5** | |
| Grid Reference | NY 18900 12371 | |
| Altitude | 256m | |
| Size of Quadrat | Two 1mx1m & two 5mX5m | |
| Alignment of Quadrat | Parallel and 90° to exclosure deer fence | |
| Location of pegs | **08-IN-1x1**<br>NE corner-orange wooden peg<br>SE,SW,NW corners- no pegs | **08-IN-5x5**<br>NW corner- orange wooden peg<br>NE corner- orange wooden peg<br>SW corner- orange wooden peg |
| | **08-OUT-1x1**<br>NW corner-orange wooden peg<br>NE,SE,SW corners no pegs | **08-OUT-5x5**<br>NW corner- orange wooden peg<br>NE corner- orange wooden peg<br>SE corner- orange wooden peg |
| Distance from exclosure | 1m from exclosure deer fence | |



| | | |
|---|---|---|
| Site Reference number | 09 | |
| Site Name | Northern fell fence | |
| Location | Immediately below upper stock fence. Clear felled area not within deer fence | |
| Quadrat reference | 2 quadrats **09-NoExcl-1x1** **&** **09-NoExcl-5x5** | |
| Grid Reference | NY 16951 13854 | |
| Altitude | 374m | |
| Size of Quadrat | 1m x 1m & 5m x 5m | |
| Alignment of Quadrat | ± N-S & E-W | |
| Location of pegs | **09-NoExcl-1x1**<br>NE corner-3" wooden stob painted orange<br>SW corner –orange wooden peg | **09-NoExcl-5x5**<br>NE corner-3" wooden stob painted orange<br>SW corner-3" wooden stob painted orange<br>NW corner -orange wooden peg<br>SE corner -orange wooden peg |
| Distance from exclosure | Not applicable | |

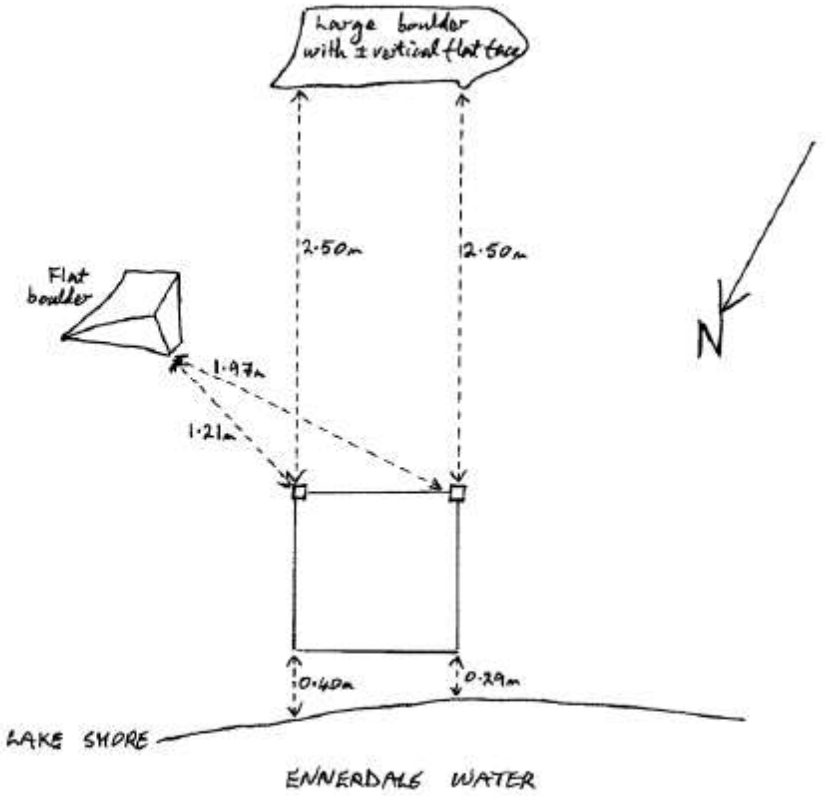


| | |
|---|---|
| Site Reference number | 10A |
| Site Name | Ennerdale Water Shore (cattle) |
| Location | SE shore of Ennerdale Water in area grazed by cattle |
| Quadrat reference | **10A-Cattle-1x1** |
| Grid Reference | NY12388 13863 |
| Altitude | 113m |
| Size of Quadrat | 1m x 1m |
| Alignment of Quadrat | N-S, E-W |
| Location of pegs | No pegs or other markers placed for quadrat |
| Distance from exclosure | Not applicable |




Ennerdale Water

| | |
|---|---|
| Site Reference number | 10B |
| Site Name | Ennerdale Water shore (No Cattle) –**Now cattle!** |
| Location | SE shore of Ennerdale Water. In area which was not grazed by cattle. Cattle recently introduced |
| Quadrat reference | **10B-NoCattle-1x1** |
| Grid Reference | NY12436 13870 |
| Altitude | 113m |
| Size of Quadrat | 1m x 1m |
| Alignment of Quadrat | $65^0$-$245^o$ & $155^o$-$335^o$ magnetic |
| Location of pegs | ESE corner-wooden peg<br>SSW corner-wooden peg |
| Distance from exclosure | Not applicable |



## 6. Quadrat Recording Sheets

| **Date** | 17/07/2013 | **Grid Ref** | NY12182 12191 |
|---|---|---|---|
| **Site No** | 01 IN | **Altitude** | 632m |
| **Site Name** | Iron Crag | **Photo No** | 1 - 3 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 4 | |
| *Calluna vulgaris* | | 5 | 11.5cm |
| *Carex pilulifera* | | 7 | 9cm (lvs) 15.5cm (fls) |
| *Deschampsia flexuosa* | | 3 | |
| *Empetrum nigrum* | | 3 | 5cm |
| *Festuca ovina/rubra* | | 5 | 10cm (lvs) 10-23cm (fls) |
| *Galium saxatile* | | 5 | |
| *Vaccinium myrtillus* | | 2 | |
| *Vaccinium vitis idaea* | | 3 | 4cm |
| | | | |
| *Hypnum jutlandicum* | | 4 | |
| *Racomitrium languinosum* | | 2 | |
| *Polytrichum Commune/ P. formosum* | | 2 | |
| | | | |
| *Cladonia* | | 1 | |
| | | | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 15/07/2013 | **Grid Ref** | NY12176 12197 |
|---|---|---|---|
| **Site No** | 01 OUT | **Altitude** | 632m |
| **Site Name** | Iron Crag | **Photo No** | 4-5 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 4 | 6cm (lvs) 12cm (fls) |
| *Calluna vulgaris* | | 4 | 3.5cm |
| *Carex pilulifera* | | 7 | 7.5cm (lvs) 15cm (fls) |
| *Empetrum nigrum* | | 1 | |
| *Festuca ovina/rubra* | | 4 | |
| *Galium saxatile* | | 5 | |
| *Nardus stricta* | | 2 | 15-20cm (lvs) 24-27cm (fls) |
| *Vaccinium myrtillus* | | 3 | 4cm |
| *Vaccinium vitis idaea* | | 3 | 4.5cm |
| | | | |
| *Dicranum scoparium* | | 1 | |
| *Hypnum jutlandicum* | | 3 | |
| *Polytrichum commune/ P. formosum* | | 2 | |
| *Racomitrium languinosum* | | 2 | |
| | | | |
| *Cladonia spp* | | 1 | |
| | | | |
| Bare rock | | 1 | |
| | | | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 24/06/2013 | **Grid Ref** | NY11965 13912 |
|---|---|---|---|
| **Site No** | 02 IN | **Altitude** | 140m |
| **Site Name** | Side Wood | **Photo No** | 6 - 8 |
| **Quadrat Size** | 5m x 5m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Anthoxanthum odoratum* | | 4 | 29cm (lvs) |
| *Betula pubescens (tree)* | | 1 | |
| *Blechnum spicant* | | 1 | |
| *Deschampsia flexuosa* | | 8 | 14cm (lvs) 29cm (fls) |
| *Dryopteris dilatata* | | 1 | |
| *Fraxinus excelsior (seedling)* | | 1 | |
| *Galium saxatile* | | 4 | |
| *Hyacinthoides non-scripta* | | 1 | |
| *Oxalis acetosella* | | 3 | |
| *Polypodium vulgare* | | 1 | |
| *Pteridium aquilinum* | | 3 | 80cm |
| *Quercus petraea (seedlings)* | | 2 | Range 15-110cm |
| *Sorbus aucuparia (seedlings/saplings)* | | 5 | Range 20-700cm |
| *Vaccinium myrtillus* | | 5 | 30cm |
| | | | |
| *Dicranum scoparium* | | 1 | |
| *Hylocomium splendens* | | 2 | |
| *Hypnum jutlandicum* | | 1 | |
| *Mnium hornum* | | 1 | |
| *Plagiothecium undulatum* | | 1 | |
| *Pleurozium schreberi* | | 1 | |
| *Rhytidiadelphus loreus* | | 8 | |
| *Sphagnum quinquefarium* | | 3 | |
| *Thuidium tamariscinum* | | 5 | |
| | | | |
| *Bazzania trilobata* | | 1 | |
| *Scapania gracilis* | | 1 | |
| | | | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 24/06/2013 | **Grid Ref** | NY11966 13911 |
|---|---|---|---|
| **Site No** | 02 OUT | **Altitude** | 140m |
| **Site Name** | Side Wood | **Photo No** | 9 - 13 |
| **Quadrat Size** | 5m x 5m | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis capillaris* | | 6 | |
| *Anthoxanthum odoratum* | | 4 | |
| *Betula pubescens (seedlings)* | | 1 | |
| *Cirsium sp* | | 1 | |
| *Conopodium majus* | | 3 | |
| *Crataegus monogyna(seedling)* | | 1 | |
| *Deschampsia flexuosa* | | 5 | 15cm (lvs) 32cm (fls) |
| *Festuca ovina/rubra* | | 2 | |
| *Fraxinus excelsior (seedlings)* | | 2 | |
| *Galium saxatile* | | 5 | |
| *Luzula multiflora* | | 2 | |
| *Oreopteris limbosperma* | | 1 | |
| *Oxalis acetosella* | | 5 | |
| *Potentilla erecta* | | 3 | |
| *Pteridium aquilinum* | | 2 | 47cm |
| *Quercus petraea (seedling)* | | 1 | |
| *Sorbus aucuparia (seedlings)* | | 3 | Range 5-6cm |
| *Vaccinium myrtillus* | | 5 | 10cm |
| | | | |
| *Atrichium undulatum* | | 1 | |
| *Campylopus flexuosus* | | 2 | |
| *Dicranum scoparium* | | 1 | |
| *Dicranodontium denudatum* | | 2 | |
| *Hypnum jutlandicum* | | 1 | |
| *Kindbergia (Eurhynchium) praelongum* | | 1 | |
| *Mylia taylorii* | | 1 | |
| *Plagiothecium undulatum* | | 1 | |
| *Pleurozium schreberi* | | 1 | |
| *Polytrichum commune/ P.formosum* | | 1 | |
| *Rhizomnium punctatum* | | 1 | |
| *Rhytidiadelphus loreus* | | 4 | |
| *Rhytidiadelphus squarrosus* | | 1 | |
| *Sphagnum quinquefarium* | | 3 | |
| *Thuidium tamariscinum* | | 6 | |
| | | | |
| *Bazzania trilobata* | | 1 | |
| *Cephalozia bicuspidata* | | 1 | |
| *Diplophyllum albicans* | | 1 | |
| *Scapania gracilis* | | 2 | |
| *Scapania nemorea* | | 1 | |
| | | | |
| Rock | | 3 | |
| Bare ground | | 2 | |

| **Date** | 07/08/13 | **Grid Ref** | NY 13030 13527 |
|---|---|---|---|
| **Site No** | 03 IN | **Altitude** | 145m |
| **Site Name** | Silver Cove cattle open | **Photo No** | 14- 17 |
| **Quadrat Size** | 1m x1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Calluna vulgaris* | | 9 | 70cm |
| *Deschampsia flexuosa* | | 2 | |
| *Galium saxatile* | | 2 | |
| *Picea sitchensis* | | 10(1sapling) | 3m |
| *Sorbus aucuparia* | | 5 (5 saplings) | 2m |
| *Vaccinium myrtillus* | | 4 | 30cm |
| | | | |
| *Hypnum jutlandicum* | | 3 | |
| *Plagiothecium undulatum* | | 1 | |
| *Rhytidiadelphus loreus* | | 2 | |
| *Sphagnum quinquefarium* | | 1 | |
| *Sphagnum russowii* | | 1 | |
| | | | |
| *Lophocolea bidentata* | | 1 | |
| *Scapania nemorea* | | 1 | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| | | | |
|---|---|---|---|
| **Date** | 07/08/13 | **Grid Ref** | NY13032 13526 |
| **Site No** | 03 OUT | **Altitude** | 145m |
| **Site Name** | Silver Cove cattle grazing open | **Photo No** | 18 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 7 | 20cm (lvs). 53cm (fls) |
| *Calluna vulgaris DEAD* | | 5 | |
| *Carex binervis* | | 1 | 17cm (lvs). 86cm (fls) |
| *Deschampsia flexuosa* | | 6 | 9cm (lvs). 50cm (fls) |
| *Dryopteris dilatata* | | 1 | |
| *Galium saxatile* | | 5 | |
| *Picea sitchensis* | | 1(1 seedling) | 43cm |
| *Vaccinium myrtillus* | | 4 | |
| | | | |
| *Dicranum majus* | | 1 | |
| *Plagiothecium undulatum* | | 1 | |
| *Pleurozium schreberi* | | 1 | |
| *Polytrichum commune/P. formosum* | | 1 | |
| *Rhytidiadelphus loreus* | | 5 | |
| *Thuidium tamariscinum* | | 1 | |
| | | | |
| *Barbilophozia floerkei* | | 1 | |
| *Diplophyllum albicans* | | 1 | |
| | | | |
| Rock | | 1 | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 07/08/13 | **Grid Ref** | NY 13249 13304 |
|---|---|---|---|
| **Site No** | 04 IN 5x5 | **Altitude** | 197m |
| **Site Name** | Silver cove cattle grazed site | **Photo No** | 19-21 |
| **Quadrat Size** | 5m x5m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 4 | 28cm (lvs). 60cm (fls) |
| *Agrostis capillaris* | | 5 | 30cm (lvs). 52cm (fls) |
| *Anthoxanthum odoratum* | | 2 | |
| *Calluna vulgaris* | | 2 | |
| *Deschampsia flexuosa* | | 8 | 14cm (lvs). 62cm (fls) |
| *Dryopteris dilatata* | | 1 | |
| *Galium saxatile* | | 8 | |
| *Larix kaempferi* | | 1(1 large tree) | |
| *Picea sitchensis* | | 3(4 seedlings) | Range 9-50cm |
| *Pteridium aquilinum* | | 1 | |
| *Sorbus aucuparia* | | 3(7 saplings) | Range 35-300cm |
| *Vaccinium myrtillus* | | 6 | 30cm |
| | | | |
| *Dicranum majus* | | 1 | |
| *Dicranum scoparium* | | 1 | |
| *Hypnum jutlandicum* | | 2 | |
| *Plagiothecium undulatum* | | 3 | |
| *Pleurozium schreberi* | | 2 | |
| *Polytrichum commune / P. formosum* | | 1 | |
| *Pseudoscleropodium purum* | | 2 | |
| *Rhytidiadelphus loreus* | | 2 | |
| *Rhytidiadelphus squarrosus* | | 3 | |
| *Sphagnum palustre/papillosum* | | 1 | |
| *Thuidium tamariscinum* | | 1 | |
| | | | |
| *Barbilophozia floerkei* | | 1 | |
| *Diplophyllum albicans* | | 1 | |
| *Lophocolea bidentata* | | 1 | |
| *Scapania gracilis* | | 1 | |
| | | | |
| *Cladonia spp* | | 1 | |
| | | | |
| Bare Rock | | 1 | |
| Wood | | 1 | |

| | | | |
|---|---|---|---|
| Rare | 1 | 26-33% | 6 |
| Sparse | 2 | 34-50% | 7 |
| Freq <4% | 3 | 51-75% | 8 |
| 5-10% | 4 | 76-90% | 9 |
| 11-25% | 5 | 91-100% | 10 |

| | | | |
|---|---|---|---|
| **Date** | 07/08/13 | **Grid Ref** | NY 13253 13306 |
| **Site No** | 04 OUT 5x5 | **Altitude** | 197m |
| **Site Name** | Silver cove cattle grazed site | **Photo No** | 22 - 24 |
| **Quadrat Size** | 5m x 5m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 4 | |
| *Agrostis capillaris* | | 4 | 17cm (lvs). 46cm (fls) |
| *Anthoxanthum odoratum* | | 4 | 18cm (lvs). 45cm (fls) |
| *Betula spp* | | 1(1 seedling) | |
| *Blechnum spicant* | | 1 | |
| *Calluna vulgaris* | | 2 | 14cm |
| *Carex pilulifera* | | 1 | |
| *Deschampsia flexuosa* | | 7 | 10cm (lvs). 63cm (fls) |
| *Dryopteris dilatata* | | 1 | |
| *Festuca ovina/ rubra* | | 2 | |
| *Galium saxatile* | | 7 | |
| *Oxalis acetosella* | | 1 | |
| *Picea sitchensis* | | 1(2 seedlings) | |
| *Pteridium aquilinum* | | 2 | |
| *Sorbus aucuparia* | | 3(8 seedlings) | Range 7-40cm |
| *Vaccinium myrtillus* | | 4 | 14cm |
| | | | |
| *Campylopus flexuosus* | | 2 | |
| *Dicranum majus* | | 2 | |
| *Hypnum jutlandicum* | | 4 | |
| *Plagiothecium undulatum* | | 3 | |
| *Pleurozium schreberi* | | 1 | |
| *Polytrichum commune / P. formosum* | | 2 | |
| *Pseudoscleropodium purum* | | 2 | |
| *Pseudotaxiphyllum elegans* | | 1 | |
| *Rhytidiadelphus loreus* | | 3 | |
| *Rhytidiadelphus squarrosus* | | 3 | |
| *Sphagnum palustre/ papillosum* | | 1 | |
| *Sphagnum quinquefarium* | | 1 | |
| | | | |
| *Diplophyllum albicans* | | 1 | |
| *Scapania gracilis* | | 1 | |
| *Scapania nemorea* | | 1 | |
| | | | |
| Bare rock | | 3 | |

| | | | |
|---|---|---|---|
| Rare | 1 | 26-33% | 6 |
| Sparse | 2 | 34-50% | 7 |
| Freq <4% | 3 | 51-75% | 8 |
| 5-10% | 4 | 76-90% | 9 |
| 11-25% | 5 | 91-100% | 10 |

| **Date** | 15/07/2013 | **Grid Ref** | NY13225 11232 |
|---|---|---|---|
| **Site No** | 05A IN | **Altitude** | 605m |
| **Site Name** | Silver Cove | **Photo No** | 25 - 30 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 2 | |
| *Calluna vulgaris* | | 1 | |
| *Carex panicea* | | 3 | 18.5cm (lvs) 32.5cm (fls) |
| *Carex pilulifera* | | 2 | |
| *Festuca ovina/rubra* | | 2 | |
| *Nardus stricta* | | 3 | 25-34cm |
| *Narthecium ossifragum* | | 5 | 22cm |
| *Potentilla erecta* | | 4 | 12.5cm |
| *Trichophorum cespitosum* | | 5 | 33.5cm |
| *Vaccinium myrtillus* | | 1 | |
| | | | |
| *Pleurozium schreberi* | | 2 | |
| *Racomitrium languinosum* | | 1 | |
| *Rhytidiadelphus loreus* | | 1 | |
| *Sphagnum spp* | | 1 | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| | | | |
|---|---|---|---|
| **Date** | 15/07/2013 | **Grid Ref** | NY13221 11233 |
| **Site No** | 05A OUT | **Altitude** | 605m |
| **Site Name** | Silvercove | **Photo No** | 31 – 34 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 3 | 10cm (lvs) 19.5cm (fls) |
| *Calluna vulgaris* | | 2 | 7cm |
| *Carex panicea* | | 3 | |
| *Festuca ovina/rubra* | | 3 | 14cm (lvs) 22cm (fls) |
| *Galium saxatile* | | 1 | |
| *Huperzia selago* | | 2 | |
| *Nardus stricta* | | 8 | 18cm (lvs) 23cm (fls) |
| *Narthecium ossifragum* | | 3 | |
| *Potentilla erecta* | | 3 | |
| *Vaccinium myrtillus* | | 4 | 5cm |
| | | | |
| *Hypnum jutlandicum* | | 1 | |
| *Pleurozium schreberi* | | 1 | |
| *Polytrichum commune* | | 1 | |
| *Sphagnum palustre/ papillosum* | | 4 | |
| | | | |
| *Diplophyllum albicans* | | 1 | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 15/07/2013 | **Grid Ref** | NY14269 10888 |
|---|---|---|---|
| **Site No** | 05B IN | **Altitude** | 715m |
| **Site Name** | Little Gowder Crag | **Photo No** | 35 – 40 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Deschampsia flexuosa* | | 5 | 18cm (lvs) 32cm (fls) |
| *Diphasiastrum alpinum* | | 3 | 7cm |
| *Festuca ovina/rubra* | | 4 | 17cm (lvs) 27cm (fls) |
| *Galium saxatile* | | 1 | |
| *Potentilla erecta* | | 3 | |
| *Vaccinium myrtillus* | | 3 | 11cm |
| | | | |
| *Hypnum jutlandicum* | | 1 | |
| *Polytrichum commune* | | 8 | 13cm |
| *Racomitrium languinosum* | | 2 | |
| *Rhytidiadelphus loreus* | | 2 | |
| | | | |
| Rock | | 0 | |
| | | | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 15/07/2013 | **Grid Ref** | NY14264 10883 |
|---|---|---|---|
| **Site No** | 05B OUT | **Altitude** | 715m |
| **Site Name** | Little Gowder Crag | **Photo No** | 41 – 46 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 5 | 5cm (lvs) 6cm (fls) |
| *Diphasiastrum alpinum* | | 4 | 2cm |
| *Festuca ovina/rubra* | | 5 | 5cm (lvs) 11cm (fls) |
| *Galium saxatile* | | 4 | |
| *Huperzia selago* | | 3 | 3cm |
| *Potentilla erecta* | | 4 | |
| *Vaccinium myrtillus* | | 5 | 3.5cm |
| | | | |
| *Hypnum jutlandicum* | | 2 | |
| *Polytrichum commune* | | 2 | |
| *Racomitrium languinosum* | | 4 | |
| | | | |
| Bare rock | | 1 | |
| | | | |
| | | | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| | | | |
|---|---|---|---|
| **Date** | 07/08/13 | **Grid Ref** | NY 18479 12781 |
| **Site No** | 06 IN | **Altitude** | 273m |
| **Site Name** | Dubs Quarry | **Photo No** | 47 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis capillaris* | | 4 | 23cm (lvs). 43cm (fls) |
| *Calluna vulgaris* | | 3 | 35cm |
| *Carex binervis* | | 2 | |
| *Deschampsia cespitosa* | | 1 | |
| *Deschampsia flexuosa* | | 4 | 67cm (fls) |
| *Fern sp (oreopteris?)* | | 1 | |
| *Festuca ovina/rubra* | | 4 | 15cm (lvs). 34cm (fls) |
| *Galium saxatile* | | 4 | |
| *Vaccinium myrtillus* | | 4 | 12cm |
| | | | |
| *Hypnum jutlandicum* | | 2 | |
| *Kinbergia (Eurhynchium) praelongum* | | 2 | |
| *Polytrichum commune/P. formosum* | | 4 | |
| | | | |

| | | | |
|---|---|---|---|
| Rare | 1 | 26-33% | 6 |
| Sparse | 2 | 34-50% | 7 |
| Freq <4% | 3 | 51-75% | 8 |
| 5-10% | 4 | 76-90% | 9 |
| 11-25% | 5 | 91-100% | 10 |

| **Date** | 07/08/13 | **Grid Ref** | NY 18479 12781 |
|---|---|---|---|
| **Site No** | 06 IN | **Altitude** | 273m |
| **Site Name** | Dubs Quarry | **Photo No** | 48 – 52 |
| **Quadrat Size** | 5m x 5M | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 6 | 14cm (lvs). 51cm (fls) |
| *Agrostis capillaris* | | 5 | 23cm (lvs). 49cm (fls) |
| *Betula spp* | | 2 | |
| *Blechnum spicant* | | 1 | |
| *Calluna vulgaris* | | 6 | 38cm |
| *Carex binervis* | | 4 | 34cm (lvs). 102cm (fls) |
| *Carex panicea* | | 3 | |
| *Chamerion angustifolium* | | 2 | |
| *Cirsium palustre* | | 2 | |
| *Deschampsia cespitosa* | | 7 | 16cm (lvs). 50cm (fls) |
| *Deschampsia flexuosa* | | 7 | 30cm (lvs). 88cm (fls) |
| *Dryopteris dilitata* | | 1 | |
| *Festuca ovina /rubra* | | 2 | |
| *Galium saxatile* | | 4 | |
| *Holcus lanatus* | | 3 | |
| *Juncus effusus* | | 2 | |
| *Juncus squarrosus* | | 1 | |
| *Juniperus communis (planted)* | | 2 | |
| *Luzula multiflora* | | 3 | |
| *Oreopteris limbosperma* | | 2 | |
| *Potentilla erecta* | | 3 | |
| *Salix spp (planted)* | | 2 | |
| *Sorbus aucuparia* | | 1 (1seedling) | |
| *Vaccinium myrtillus* | | 2 | |
| | | | |
| *Campylopus flexuosus* | | 1 | |
| *Campylopus introflexus* | | 1 | |
| *Hypnum jutlandicum* | | 5 | |
| *Kindbergia (Eurhynchium) praelongum* | | 2 | |
| *Pleurozium schreberi* | | 1 | |
| *Polytrichum commune/P. formosum* | | 5 | |
| *Rhytidiadelphus squarrosus* | | 2 | |
| | | | |
| Tree stumps | | 3 | |
| Rock | | 1 | |

| | | | |
|---|---|---|---|
| Rare | 1 | 26-33% | 6 |
| Sparse | 2 | 34-50% | 7 |
| Freq <4% | 3 | 51-75% | 8 |
| 5-10% | 4 | 76-90% | 9 |
| 11-25% | 5 | 91-100% | 10 |

| **Date** | 07/08/13 | **Grid Ref** | NY 18473 12764 |
|---|---|---|---|
| **Site No** | 06 OUT | **Altitude** | 273m |
| **Site Name** | Dubs Quarry | **Photo No** | 53 - 54 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 5 | 23cm (lvs). 45cm (fls) |
| *Agrostis capillaris* | | 5 | |
| *Carex binervis* | | 5 | 22cm(lvs). 58cm (fls) |
| *Deschampsia flexuosa* | | 5 | 13cm(lvs) . 58cm (fls) |
| *Dryopteris dilitata* | | 1 | |
| *Festuca ovina/rubra* | | 2 | |
| *Galium saxatile* | | 6 | |
| *Holcus lanatus* | | 2 | |
| *Juncus squarrosus* | | 2 | 20cm (lvs). 39cm (fls) |
| | | | |
| *Hypnum jutlandicum* | | 2 | |
| *Polytrichum commune/P. formosum* | | 3 | |
| *Rhytidiadelphus squarrosus* | | 2 | |
| | | | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 07/08/13 | **Grid Ref** | NY 18473 12764 |
|---|---|---|---|
| **Site No** | Q06 OUT | **Altitude** | 273m |
| **Site Name** | Dubs Quarry | **Photo No** | 55 – 57 |
| **Quadrat Size** | 5m x 5m | | |

| **Species** | **Cover** | **Average Height** |
|---|---|---|
| *Agrostis canina* | 5 | |
| *Agrostis capillaris* | 4 | |
| *Anthoxanthum odoratum* | 2 | |
| *Betula spp* | 1(1 seedling) | |
| *Blechnum spicant* | 1 | |
| *Calluna vulgaris* | 5 | 35cm |
| *Carex binervis* | 5 | |
| *Cirsium palustre* | 1 | |
| *Deschampsia cespitosa* | 1 | |
| *Deschampsia flexuosa* | 8 | 16cm (lvs). 51cm (fls) |
| *Dryopteris borreri* | 1 | |
| *Dryopteris dilitata* | 1 | |
| *Festuca ovina/ rubra* | 3 | |
| *Galium saxatile* | 7 | |
| *Holcus lanatus* | 3 | |
| *Juncus effusus* | 1 | 88cm |
| *Juncus squarrosus* | 1 | |
| *Oreopteris limbosperma* | 1 | |
| *Picea sitchensis* | 3(1 sapling) | 2m |
| *Potentilla erecta* | 3 | |
| *Sorbus aucuparia* | 1 (2 seedlings) | |
| *Vaccinium myrtillus* | 2 | |
| | | |
| *Campylopus flexuosus* | 1 | |
| *Campylopus introflexus* | 1 | |
| *Hypnum jutlandicum* | 5 | |
| *Polytrichum commune/P. formosum* | 3 | |
| *Rhytidiadelphus loreus* | 3 | |
| *Rhytidiadelphus squarrosus* | 1 | |
| | | |
| Rock | 1 | |
| Tree stumps and brash | 4 | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 13/08/2013 | **Grid Ref** | NY 18247 12635 |
|---|---|---|---|
| **Site No** | 07 No Excl | **Altitude** | 242m |
| **Site Name** | Upper Valley South Side | **Photo No** | 58 - 61 |
| **Quadrat Size** | 5m x 5m | | |

| **Species** | **Cover** | **Average Height** |
|---|---|---|
| *Agrostis canina* | 4 | |
| *Agrostis capillaris* | 5 | 42cm (fls), 10cm (lvs) |
| *Calluna vulgaris* | 5 | 19cm |
| *Carex binervis* | 1 | |
| *Carex pilulifera* | 1 | |
| *Deschampsia cespitosa* | 2 | |
| *Deschampsia flexuosa* | 8 | 65cm (fls), 12cm (lvs) |
| *Dryopteris dilitata* | 1 | |
| *Erica cinerea* | 2 | |
| *Festuca ovina/ rubra* | 3 | |
| *Galium saxatile* | 3 | |
| *Holcus lanatus* | 1 | |
| *Juncus effusus* | 1 | |
| *Juncus squarrosus* | 4 | |
| *Luzula multiflora* | 3 | |
| *Picea sitchensis* | 3(4 saplings) | 20-200cm |
| *Potentilla erecta* | 1 | |
| *Quercus petraea (planted)* | 2(4 saplings) | 10-30cm |
| | | |
| *Campylopus flexuosus* | 2 | |
| *Hypnum jutlandicum* | 2 | |
| *Plagiothecium undulatum* | 1 | |
| *Polytrichum commune* | 4 | |
| *Rhytidiadelphus squarrosus* | 3 | |
| | | |
| *Diplophyllum albicans* | 1 | |
| *Lepidozia reptans* | 1 | |
| *Nowellia curvifolia* | 1 | |
| | | |
| Rock | 1 | |
| Tree Stumps | 1 | |

| | | | |
|---|---|---|---|
| Rare | 1 | 26-33% | 6 |
| Sparse | 2 | 34-50% | 7 |
| Freq <4% | 3 | 51-75% | 8 |
| 5-10% | 4 | 76-90% | 9 |
| 11-25% | 5 | 91-100% | 10 |

| **Date** | 13/08/2013 | **Grid Ref** | NY 18247 12635 |
|---|---|---|---|
| **Site No** | 07 NoExcl | **Altitude** | 242m |
| **Site Name** | Upper Valley South Side | **Photo No** | 62 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 4 | |
| *Agrostis capillaris* | | 5 | 40cm (fls), 14cm (lvs) |
| *Calluna vulgaris* | | 5 | 25cm |
| *Deschampsia cespitosa* | | 5 | 98cm (fls), 37cm (lvs) |
| *Deschampsia flexuosa* | | 7 | 55cm (fls), 13cm (lvs) |
| *Festuca ovina/ rubra* | | 2 | |
| *Galium saxatile* | | 2 | |
| *Holcus lanatus* | | 1 | |
| *Juncus squarrosus* | | 3 | |
| *Vaccinium myrtillus* | | 1 | |
| | | | |
| *Polytrichum commune/P. formosum* | | 3 | |
| *Rhytidiadelphus squarrosus* | | 3 | |
| | | | |
| | | | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 13/08/2013 | **Grid Ref** | NY 18900 12371 |
|---|---|---|---|
| **Site No** | 08 IN | **Altitude** | 256m |
| **Site Name** | River Liza Upper Bend | **Photo No** | 63 – 66 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis capillaris* | | 4 | 45cm (fls), 21cm (lvs) |
| *Deschampsia flexuosa* | | 4 | 56cm (fls), 20cm (lvs) |
| *Luzula multiflora* | | 2 | |
| *Molinia caerulea* | | 5 | 82cm (fls), 52cm(lvs) |
| *Nardus stricta* | | 3 | |
| *Vaccinium myrtillus* | | 1 | |
| | | | |
| *Hypnum jutlandicum* | | 7 | |
| *Polytrichum commune* | | 4 | |
| *Sphagnum palustre / papillosum* | | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 13/08/2013 | **Grid Ref** | NY 18900 12371 |
|---|---|---|---|
| **Site No** | 08 IN | **Altitude** | 256m |
| **Site Name** | River Liza Upper Bend | **Photo No** | 67 - 69 |
| **Quadrat Size** | 5m x 5m | | |

| **Species** | **Cover** | **Average Height** |
|---|---|---|
| *Agrostis canina* | 4 | 75cm (fls), 28cm(lvs) |
| *Agrostis capillaris* | 4 | 40cm (fls), 7cm (lvs) |
| *Betula spp* | 3 several saplings | |
| *Calluna vulgaris* | 5 | 45cm |
| *Carex binervis* | 3 | 114cm (fls), 18cm (lvs) |
| *Carex pilulifera* | 1 | |
| *Chamerion angustifolium* | 1 | |
| *Deschampsia flexuosa* | 8 | |
| *Dryopteris dilitata* | 1 | |
| *Festuca ovina/ rubra* | 4 | |
| *Festuca vivipara* | 2 | |
| *Galium saxatile* | 2 | |
| *Juncus squarrosus* | 2 | |
| *Luzula multiflora* | 3 | |
| *Molinia caerulea* | 2 | |
| *Nardus stricta* | 1 | |
| *Picea sitchensis* | 4( 3 saplings ) | 200cm |
| *Pinus sylvestris* | 2(2 saplings) | 100-200cm |
| *Vaccinium myrtillus* | 1 | |
| | | |
| *Atrichum undulatum* | 1 | |
| *Campylopus flexuosus* | 1 | |
| *Campylopus introflexus* | 1 | |
| *Dicranum scoparium* | 1 | |
| *Hylocomium splendens* | 3 | |
| *Hypnum jutlandicum* | 4 | |
| *Plagiothecium undulatum* | 1 | |
| *Pogonatum urnigerum* | 1 | |
| *Polytrichum commune/ formosum* | 4 | |
| *Pseudotaxiphyllum elegans* | 1 | |
| *Rhytidiadelphus squarrosus* | 1 | |
| *Sphagnum palustre/ papillosum* | 1 | |
| | | |
| *Diplophyllum albicans* | 1 | |
| *Lophocolea bidentata* | 1 | |
| | | |
| *Cladonia spp* | 1 | |
| | | |
| Bare Rock | 1 | |
| Tree stumps | 1 | |

| **Date** | 13/08/2013 | **Grid Ref** | NY 18900 12371 |
|---|---|---|---|
| **Site No** | 08 OUT | **Altitude** | 256m |
| **Site Name** | River Liza Upper Bend | **Photo No** | 70 – 71 |
| **Quadrat Size** | 1m x1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis canina* | | 3 | |
| *Agrostis capillaris* | | 3 | |
| *Calluna vulgaris* | | 3 | 7cm |
| *Carex binervis* | | 2 | |
| *Carex echinata* | | 4 | |
| *Carex panicea* | | 4 | |
| *Deschampsia flexuosa* | | 5 | 11cm (lvs), 46cm(fls) |
| *Fern spp* | | 1 | |
| *Galium saxatile* | | 2 | |
| *Luzula multiflora* | | 2 | |
| *Potentilla erecta* | | 1 | |
| | | | |
| *Polytrichum commune/ P. formosum* | | 3 | |
| *Hypnum jutlandicum* | | 1 | |
| *Campylopus flexuosus* | | 1 | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 13/08/2013 | **Grid Ref** | NY 18900 12371 |
|---|---|---|---|
| **Site No** | 08 OUT | **Altitude** | 256m |
| **Site Name** | River Liza Upper Bend | **Photo No** | 72 – 77 |
| **Quadrat Size** | 5m x 5m | | |

| **Species** | **Cover** | **Average Height** |
|---|---|---|
| *Agrostis canina* | 4 | |
| *Agrostis capillaris* | 5 | 29cm (fls), 10cm(lvs) |
| *Calluna vulgaris* | 3 | |
| *Carex binervis* | 4 | |
| *Carex echinata* | 1 | |
| *Carex panicea* | 3 | |
| *Deschampsia flexuosa* | 5 | 45cm (fls), 10cm (lvs) |
| *Digitalis purpurea* | 1 | |
| *Dryopteris borreri* | 1 | |
| *Dryopteris dilitata* | 1 | |
| *Festuca ovina / rubra* | 3 | |
| *Galium saxatile* | 1 | |
| *Juncus squarrosus* | 3 | |
| *Luzula multiflora* | 2 | |
| *Nardus stricta* | 1 | |
| *Picea sitchensis* | 2(2 saplings) | 30-150cm |
| *Potentilla erecta* | 2 | |
| *Salix spp* | 1 | |
| *Vaccinium myrtillus* | 2 | 17cm |
| | | |
| *Campylopus flexuosus* | 2 | |
| *Campylopus introflexus* | 1 | |
| *Dicranum scoparium* | 3 | |
| *Hypnum jutlandicum* | 4 | |
| *Polytrichum commune/P. formosum* | 4 | |
| *Rhytidiadelphus loreus* | 1 | |
| *Rhytidiadelphus squarrosus* | 4 | |
| *Sphagnum inundatum* | 1 | |
| | | |
| *Lophocolea bidentata* | 1 | |
| | | |
| Bare Ground | 1 | |
| Tree stump/ brash | 4 | |
| Rock | 1 | |

| | | | |
|---|---|---|---|
| Rare | 1 | 26-33% | 6 |
| Sparse | 2 | 34-50% | 7 |
| Freq <4% | 3 | 51-75% | 8 |
| 5-10% | 4 | 76-90% | 9 |
| 11-25% | 5 | 91-100% | 10 |

| **Date** | 13/08/2013 | **Grid Ref** | NY 16951 13854 |
|---|---|---|---|
| **Site No** | 09 No Excl | **Altitude** | 374m |
| **Site Name** | Northern Fell Fence | **Photo No** | 78 – 79 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Agrostis capillaris* | | 4 | |
| *Anthoxanthum odoratum* | | 5 | 32cm (fls), 12cm (lvs) |
| *Calluna vulgaris* | | 1 | |
| *Carex binervis* | | 5 | 56cm (fls) , 17cm (lvs) |
| *Deschampsia flexuosa* | | 5 | 43cm (fls) 12cm (lvs) |
| *Digitalis purpurea* | | 1 | |
| *Festuca ovina/ rubra* | | 5 | 12cm (fls), 10cm (lvs) |
| *Galium saxatile* | | 3 | |
| *Holcus lanatus* | | 2 | |
| *Vaccinium myrtillus* | | 1 | |
| | | | |
| *Dicranella heteromalla* | | 2 | |
| *Hylocomium splendens* | | 3 | |
| *Hypnum jutlandicum* | | 2 | |
| *Pogonatum urnigerum* | | 2 | |
| *Polytrichum commune* | | 1 | |
| *Rhytidiadelphus squarrosus* | | 4 | |
| | | | |
| Bare Ground | | 4 | |
| Rock | | 1 | |
| | | | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 13/08/2013 | **Grid Ref** | NY 16951 13854 |
|---|---|---|---|
| **Site No** | 09 NoExcl | **Altitude** | 374m |
| **Site Name** | Northern Fell Fence | **Photo No** | 80 - 83 |
| **Quadrat Size** | 5m x 5m | | |

| **Species** | **Cover** | **Average Height** |
|---|---|---|
| *Agrostis canina* | 4 | |
| *Agrostis capillaris* | 7 | 21cm (flr), 12cm (lvs) |
| *Anthoxanthum odoratum* | 4 | |
| *Calluna vulgaris* | 4 | 9cm |
| *Carex binervis* | 2 | |
| *Cerastium fontanum* | 1 | |
| *Deschampsia flexuosa* | 7 | 44cm (flr), 12cm (lvs) |
| *Digitalis purpurea* | 1 | |
| *Festuca ovina/rubra* | 4 | 20cm (flr),9cm (lvs) |
| *Galium saxatile* | 7 | |
| *Holcus lanatus* | 1 | |
| *Juncus effusus* | 3 | 79cm |
| *Juncus squarrosus* | 1 | |
| *Luzula multiflora* | 2 | |
| *Nardus stricta* | 1 | |
| *Rumex acetosella* | 4 | |
| *Vaccinium myrtillus* | 3 | |
| | | |
| *Campylopus flexuosus* | 1 | |
| *Campylopus introflexus* | 1 | |
| *Dicranella heteromalla* | 1 | |
| *Hylocomium splendens* | 4 | |
| *Hypnum jutlandicum* | 1 | |
| *Pogonatum urnigerum* | 1 | |
| *Polytrichum commune* | 4 | |
| *Polytrichum juniperinum* | 1 | |
| *Rhytidiadelphus loreus* | 2 | |
| *Rhytidiadelphus squarrosus* | 5 | |
| | | |
| *Cladonia spp* | 2 | |
| | | |
| Bare Ground | 1 | |
| Rocks | 3 | |
| Tree stumps | 3 | |

| | | | |
|---|---|---|---|
| Rare | 1 | 26-33% | 6 |
| Sparse | 2 | 34-50% | 7 |
| Freq <4% | 3 | 51-75% | 8 |
| 5-10% | 4 | 76-90% | 9 |
| 11-25% | 5 | 91-100% | 10 |

| **Date** | 24/06/2013 | **Grid Ref** | NY12388 13863 |
|---|---|---|---|
| **Site No** | 10A | **Altitude** | 113m |
| **Site Name** | Ennerdale Water shore cattle | **Photo No** | 84 – 87 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Calluna vulgaris* | | 1 | |
| *Carex viridula ssp oedocarpa* | | 3 | |
| *Drosera rotundifolia* | | 3 | |
| *Erica tetralix* | | 2 | |
| *Molinia caerulea* | | 5 | 7.5cm (lvs) |
| *Nardus stricta* | | 5 | 10cm (lvs)20cm (fls) |
| *Narthecium ossifragum* | | 4 | 4cm (lvs) |
| *Pedicularis sylvatica* | | 1 | |
| *Pinguicula vulgaris* | | 2 | |
| *Potentilla erecta* | | 2 | |
| *Trichophorum cespitosum* | | 1 | |
| | | | |
| *Campylopus atrovirens* | | 4 | |
| *Polytrichum commune* | | 4 | |
| *Sphagnum palustre/ papillosum* | | 1 | |
| | | | |
| *Marsupella emarginata* | | 3 | |
| | | | |
| Bare ground/rock | | 5 | |
| | | | |
| | | | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

| **Date** | 24/06/2013 | **Grid Ref** | NY12436 13870 |
|---|---|---|---|
| **Site No** | 10B | **Altitude** | 113m |
| **Site Name** | Ennerdale Water shore no cattle | **Photo No** | 88 - 92 |
| **Quadrat Size** | 1m x 1m | | |
| | | | |
| **Species** | | **Cover** | **Average Height** |
| *Carex echinata* | | 2 | |
| *Carex panicea* | | 3 | |
| *Carex viridula ssp oedocarpa* | | 1 | |
| *Drosera rotundifolia* | | 3 | |
| *Hydrocotyle vulgaris* | | 1 | |
| *Juncus bulbosus* | | 2 | |
| *Littorela uniflora* | | 2 | |
| *Molinia caerulea* | | 4 | 7cm (lvs) |
| *Nardus stricta* | | 5 | 11cm (lvs) 21cm (fls) |
| *Narthecium ossifragum* | | 4 | 2cm (lvs) |
| *Potentilla erecta* | | 1 | |
| *Trichophorum cespitosum* | | 2 | |
| | | | |
| *Campylopus atrovirens* | | 1 | |
| *Polytrichum commune* | | 1 | |
| *Sphagnum spp* | | 1 | |
| | | | |
| *Marsupella emarginata* | | 1 | |
| | | | |
| Bare ground/rock | | 4 | |

| | |
|---|---|
| Rare | 1 |
| Sparse | 2 |
| Freq <4% | 3 |
| 5-10% | 4 |
| 11-25% | 5 |
| 26-33% | 6 |
| 34-50% | 7 |
| 51-75% | 8 |
| 76-90% | 9 |
| 91-100% | 10 |

## 7. References

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